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Contractors and Engineers Monthly

Vol. 43, No. 5

MAY, 1946

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Covering the Field

• Bituminous Road Work

Several types of bituminous resurfacing projects are described in this issue. On page 1 is an account of rebuilding and surfacing 24 miles of state highway, using a plant-mix top on a stone or slag base. The contract for the improvement of a heavily traveled four-lane route, involving concrete patching as well as hot-mix surfacing, is described on page 24. Hot-mix base and sheet-asphalt top were used to improve a 2-mile stretch of U. S. 1 through a town (page 74).

• Airport Construction

Bigger planes and heavier wheel loads are requiring considerable reconstruction at airports throughout the country to accommodate today's air traffic. One such project was the paving of a new 200,000-square-yard concrete parking apron at an Army field. The story starts on this page.

• County Highway Problems

The set-up necessary to look after 3,530 miles of county highways, as well as some interesting cost data on equipment operation in the country's largest county, is discussed on page 2. In contrast to the size of this county and its problems are those of many rural counties such as Crawford County, Ark., (see page 33). A message of special interest to County Commissioners on the value of engineering services in county road work appears on page 66.

• Channel Dredging

The successive steps in maintaining the deep-water channel in the Delaware River are described on page 6. Part I covers the use of U. S. E. D. hopper dredges to move material from the channel and deliver it to specially prepared holes in the river bottom. Part II carries on the story with a description of the pipe-line dredges used to transfer the material to areas on shore.

• Bridge Projects

A new stone-faced reinforced-concrete arch bridge, with a clear span of 78½ feet and designed for H-20 loading, was recently built with a small labor force to replace an old structure with an H-5 loading (see page 14). Not all old structures are being replaced, as sentiment is strong with regard to old covered bridges. The work to strengthen and restore one such picturesque span is described on page 47.

• Concrete Paving

As part of the project to convert a main U. S. route into a dual highway, 10 miles of 22-foot concrete pavement, awarded as three contracts to the same contractor, was recently completed. See page 37.

• Flood-Control Channel

The construction of 15,000 linear feet of 40-foot-wide reinforced-concrete channel and a steel pile and rock outlet was included in the San Bernardino flood-control project (page 41).

(You will find "In This Issue" on page 4)

New Parking Apron At Army Air Base

Koss Construction Co. Has Contract for Paving With Concrete Area to Carry Heavier Wheel Loads

(Photos on pages 50 and 51)

† THE premature failure of a 200,000-square-yard parking apron at the Roswell Army Air Base made reconstruction of the entire area necessary. The old apron, consisting of a 2-inch bituminous mat supported on 6 inches of soil-cement, was designed for earlier Army bombers of the B-17 class, but 400-psi wheel loads under B-29 Superforts which now use the apron caused such extensive crack patterns that the need for stronger material became evident.

The new apron, consisting of plain concrete 9 and 13½ inches thick, has been built by Koss Construction Co. of Des Moines, Iowa, under a \$590,000 contract with the Albuquerque Office of the U. S. Engineer Department. Removal of the old apron by tractor-drawn rippers gave the engineers and construction men of eastern New Mexico a very interesting insight into the problem of breaking up this material.

Job Features

The new apron has been placed in exactly the same location as the old one. This parking apron is situated at the vertex of the main runways, in front of the control tower and administration buildings. Planes which land on the Roswell field may taxi in and park on this strip. Engines may be repaired or adjusted and gasoline taken on there.

The elevation of the parking apron is 3,645 feet above sea level. Roswell is situated in the eastern part of New Mexico, on the eastern slope of the Continental Divide. Military airplanes, both bombers and fighters, use the Roswell base for training, and for landing planes in transit across the United States.

It was not the spilling of gasoline on the surface of the parking space which caused the pavement to fail, as was the case many times in the Marianas and

(Continued on page 20)



C. & E. M. Photo

The new concrete sea wall at Narragansett, R. I., has a granite facing. Here a Lorain truck crane sets the facing stone, while pile-driving operations continue in the background.

Concrete Sea Wall Is Built on Piles

Ocean Is Constant Hazard As Trench Is Dug Below Sea Level for New Wall On Rhode Island Coast

† WITH the waves of the Atlantic Ocean breaking at high tide on the edge of a trench in which a sea wall is being constructed, the contractor doing the job must be ever on the alert to prevent his work from being destroyed and washed away before his very eyes. Such was the condition that confronted the M. A. Gammino Construction Co. of Providence, R. I., during the building of a new concrete sea wall for the Rhode Island Department of Public Works at Narragansett on the southeastern seaboard of "Little Rhody". The recently completed masonry-faced wall is 478 feet long, beginning at the Municipal Bathing Pavilion and extending southward to tie in to the existing wall that had been built five years ago by the same contractor and, incidentally, with the same Superintendent and Resident Engineer directing the operations.

This \$72,143.66 contract is part of a sea-wall extension and park-area de-

(Continued on page 79)

State Rebuilds 24 Miles of Road

Plant-Mix Laid on Base Course of Stone or Slag; Bridge-Raising Contract Checks High-Water Threat

† A 24-MILE section of West Virginia State Route 17 was rebuilt and surfaced with plant-mix last summer and autumn under the direction of the State Road Commission. The improvement of this road, which winds along the south or right bank of the Kanawha River, began near Winfield, about 25 miles northwest of Charleston, and continued on, paralleling the river, to a point within 5 miles of Henderson or Point Pleasant where the Kanawha empties into the Ohio River. This river road, built in 1929, consisted of a 20-foot gravel top of varying thickness, flanked by 6-foot shoulders and 3-foot ditches. Adjoining portions of the road, a 5-mile section above and an 11-mile section below the 1945 reconstruction, had been improved five years ago, so that now the western part of the state is served by two good roads leading from the capital of the Mountain State along either bank of the Kanawha River northwest to the towns along the Ohio.

During the flood season, water from the Ohio has backed up in the Kanawha River, causing it to overflow its banks and to flood portions of this road, with a resultant damage to the gravel surface. Consequently this reconstruction was necessary not only to provide a new pavement for one already in need of repairs, but also to raise the grade in those places along the road which were subject to flooding, and bring them above the high-water level. Three bridges on this road were raised and also widened by the Kanawha Construction Co. of South Charleston, W. Va., in a \$40,000 contract awarded by the State Road Commission.

Base Course

The horizontal alignment of the old road was held throughout, and the new base course, crushed stone in some places and slag in others, was laid on top of the original gravel surface. Two courses of plant-mix were later laid on the base. In eight different locations, averaging about ¼ mile in length and including the approaches to the three bridges, the grade of the road was low and had to be raised on an average from 1½ to 4 feet to bring it above the elevation of previous floods.

As near to each of these locations as possible, a borrow pit containing gravel was purchased to provide the material needed for the fills. Two shovels worked these pits at different times, a Lorain 1¼-yard and a Northwest 1-yard, loading two FWD trucks with a 6-yard capacity for an average haul of

(Continued on page 91)



C. & E. M. Photo

Slag for road base on a section of West Virginia Route 17 was delivered by barge, unloaded to a hopper, and stockpiled by a system of Barber-Greene conveyors which kept the material moving continuously and piled it in orderly fashion.

Country's Largest County Has 3,530-Mile Road Job

Centralized Authority, Advance Planning, Good Organization, Economy Feature Road Department

† THE biggest county in America is larger than the combined eastern states of New Jersey, Massachusetts, Rhode Island, and Delaware. Enough highways crisscross its 13,000,000 acres to reach from San Francisco to New York and back again, 6,000 miles in all, and 3,530 miles of this total are county-maintained. This incredible county has sea, level elevations, and mountain peaks which reach 11,845 feet into the clouds. While part of the county is shivering in snow, roses bloom among orange trees in another section. A total of 197,000 people live there.

It is a land of fertile valleys, of metropolitan cities, of mountain playground resorts, and barren deserts. It makes its living from agriculture, mining, tourists, and industry. It has its own flood-control district on so large a scale that it has been divided into six zones to deal with six different areas of this county.

The annual budget of the Road Department is about \$750,000, which has to be spread over 3,530 miles of county highways, nearly half of which are modern and fast. There are 275 pieces of heavy equipment. Labor has not been very plentiful, but new residents have been, and John Q. Public is a constant critic. The job of County Surveyor is an elective one, so he has to produce results.

That in brief is what Howard L. Way, the County Surveyor and Highway Commissioner of San Bernardino County, Calif., is up against. In addition to this, he is also Chief Engineer for the County Flood Control District. To see the San Bernardino Road Department at work, compared to that of many a smaller more backward county, is like going from a country store into a supermarket. It is strictly big time, and the thing that has made it so is a centralization of authority and control which long ago replaced the outmoded system of "each road overseer his own boss".

San Bernardino County's population is increasing by leaps and bounds each year, due to a heavy influx of immigrants from the east and midwest. Its roads are being used much more than

By RAYMOND P. DAY,
Western Field Editor

ever before, now that the war is over, and new construction as well as maintenance is necessary. In the 1946 budget, for example, \$284,100 has been allotted for new construction. A total of 76 sections of new work is involved; some only 0.1 mile long and others 3 to 4 miles in length.

The county books are so accurate that the County Commissioner's office can predict to the cent what new construction or maintenance is going to cost per mile for every type of road during the coming fiscal year. The post-war planning system is so comprehensive that it will dovetail not only with present requirements, but with traffic needs 25 years hence. San Bernardino County's appraisal of the job ahead has been blunt, but realistic. In that county the taxpayers are sovereign, and every penny will be spent to squeeze maximum value for their money.

Road Department Organization

The County Road Department is governed by a board of five supervisors, elected by the people at a county election. Present Supervisors are Arthur L. Doran of the 1st District at Barstow; Will R. Mason of the 2nd District at Upland; S. Wesley Break of the 3rd District at Bryn Mawr; Frank S. Mogle of the 4th District at Chino; and Howard L. Holcomb of the 5th District at San Bernardino. The Board of Supervisors controls the offices of Highway Commissioner and Assistant Highway Commissioner by appointment, but the post of County Surveyor is elective.

These five Supervisors, working in close harmony with the Highway Commissioner, determine the needs of each of their districts in matters relating to construction, widening, and maintenance work on roads, bridges, and flood-control work governed by the County. Having five supervisors has given a well balanced county-wide result. Each supervisor, at meetings, approaches Mr. Way with a "Can you figure a method to solve this, Howard?" attitude. The relationship and results are excellent, as you can sense immediately even farther down in the organization.

The office of Highway Commissioner was combined with that of County Sur-

(Continued on page 95)

Detailed Records of Cost Of Equipment Operation An Aid to Economy in San Bernardino County

† SAN BERNARDINO County, Calif., operates 275 pieces of heavy equipment. Because public pressure for economy is so strong, the County keeps a running record of the cost of operating and maintaining each machine. Charges are entered daily on a card which is made for each machine when it is purchased.

The following table shows what this County has expended for operation and maintenance of some of its major units. The charges do not include the operator's wages:

EQUIPMENT	DATE PURCHASED	DAYS WORKED	COST PER DAY
Power Shovels			
Bucyrus-Erie 1/2-cubic-yard	1-3-40	645.3	\$12.72
Bucyrus-Erie 10-B	7-21-36	655	11.48
Bay City 1/2-cubic-yard	7-27-37	362.6	19.32
Bucyrus-Erie 10-B	10-25-37	683.4	13.53
Northwest 1 1/2-cubic-yard	4-28-38	663.2	20.29
Koehring 3/4-cubic-yard	10-17-38	437	26.51
Motor Graders			
Austin-Western 99	3-3-39	904.5	9.08
Caterpillar No. 11	5-25-36	506	10.84
Caterpillar single-drive	8-25-37	880.2	6.56
Caterpillar tandem-drive	4-30-38	836.1	8.55
Austin-Western 99	9-5-39	826.4	8.70
Austin-Western 99	1-15-39	386.7	18.14
Austin-Western 77	12-11-37	287.5	16.30
Austin-Western 99	4-28-39	1,011.4	8.95
Austin-Western 99	12-27-39	608.6	5.28
Austin-Western 99	7-8-40	793.2	12.40
Adams 501	8-9-40	979.2	7.73
Austin-Western 99	9-27-40	784.5	9.58
Austin-Western 99	7-1-41	808.2	9.66
Austin-Western 99M	3-13-44	91.3	5.91
Austin-Western 99M	3-13-44	255.1	4.47
Tractors With Bulldozers			
Allis-Chalmers Model L	7-27-38	797.4	17.83
Allis-Chalmers Model L	5-12-38	664.6	19.40
Allis-Chalmers HD-14	11-15-40	670.1	21.94
Caterpillar D7	3-19-41	924.6	10.73
Caterpillar D6	8-25-41	728.4	5.70
Allis-Chalmers track-laying	10-4-41	773.2	11.99
Allis-Chalmers HD-14	8-9-43	417.3	13.06
Allis-Chalmers track-laying	10-11-43	397	9.79
Tractors			
Allis-Chalmers K	7-17-36	147.2	8.54
Caterpillar Thirty-Five	6-26-33	447.2	8.30
Allis-Chalmers K	7-24-34	578.5	5.57
Allis-Chalmers K	10-31-32	133.5	12.92
Allis-Chalmers K	7-14-34	198.3	6.07
Allis-Chalmers No. 35	9-8-33	171.5	5.21
Allis-Chalmers No. 35	8-9-33	43.7	16.84
Road-Mixers			
Gardner	4-2-40	475.7	22.66

Air Compressors			
Ingersoll-Rand 315-cfm		43.3	13.22
Ingersoll-Rand 315-cfm	2-2-28	23.2	16.90
Ingersoll-Rand 105-cfm	7-14-28	180.6	3.45
Sullivan	6-14-40	85.2	3.40
Power Saws			
Wade 5-foot blade	8-27-37	27.2	4.81
Worthington	6-25-40	89.2	5.59
Dirt-Moving Scrapers			
Adams 5-cubic-yard	9-18-39	379.2	5.17
LeTourneau 8.2-cubic-yard	10-29-40	457	2.04
Wooldridge 12-cubic-yard	8-9-43	407.4	4.76
Wooldridge 12-cubic-yard	10-11-43	328.5	3.74
Power Loaders			
Austin-Western 99	9-21-40	249.5	10.12
Hough tractor loader	3-2-43	332.4	8.18
Hough tractor loader	8-28-44	27.7	5.62
Trucks			
Ford 2-yard dump	12-12-40	1,007.6	5.59
Chevrolet 1 1/2-ton service	10-7-33	56.2	1.41
Dodge 1 1/2-ton service	2-7-38	769.7	1.20
Ford 1 1/2-ton stake body	6-11-34	45.6	3.20
International 3-ton	6-27-30	771.4	2.15
Ford pick-up	2-18-36	783.5	1.10
Hudson station wagon	1-26-44	141	1.90
Ford 2-yard dump	2-12-40	889.2	5.38
Chevrolet pick-up	2-7-40	787.7	2.19
International semi-trailer	6-8-44	149.5	16.48
International 4-yard dump	2-28-36	744.1	6.24
Ford 2 1/2-yard dump	6-6-36	220	3.89
GMC 1-ton dump	9-22-34	1,004.5	2.27
White 9-ton flat-bed	6-12-30	247	4.35
Ford 2-yard dump	12-2-40	1,123.6	2.81
Mack 4-yard dump	7-18-35	628.5	13.89
Ford pick-up	7-23-41	620.6	1.54
Ford 1-ton service	7-22-41	681.3	1.38
Dodge 4-yard dump	7-3-29	933.4	1.80
Ford 2-yard dump	3-2-35	959.6	1.60
Ford 2-yard dump	12-12-40	818.1	3.61
International 4-yard dump	7-24-44	231.2	5.23
Chevrolet 2-yard dump	8-24-44	41.2	4.17
Ford 2-yard dump	2-17-40	669.3	4.95
Pontiac station wagon	5-13-40	871.6	1.18
GMC 4-yard dump	9-1-41	817.2	7.72
GMC 4-yard dump	8-15-41	626.1	9.05
Ford pick-up	7-24-41	405.2	2.15
Chevrolet coupe pick-up	2-26-40	1,132.0	1.45
GMC 3-yard dump	12-16-39	705.3	6.12
International 3-yard dump	12-13-39	931.2	2.12

In addition to these costs, the County has made an accurate study of maintenance costs per mile for its passenger automobiles. Maintenance cost includes gasoline, oil, repairs, and depreciation, but does not include insurance.

Passenger automobile costs ran as follows:

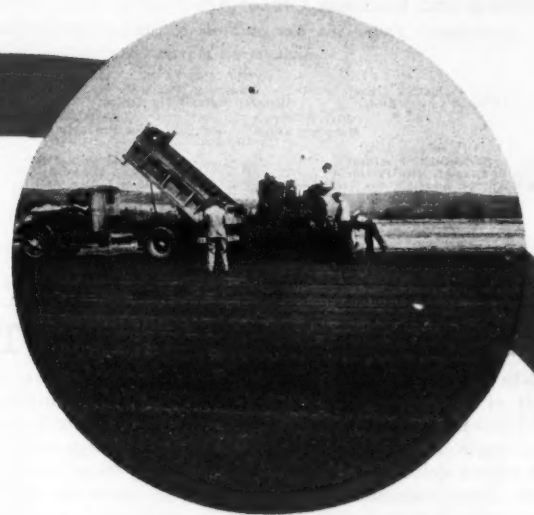
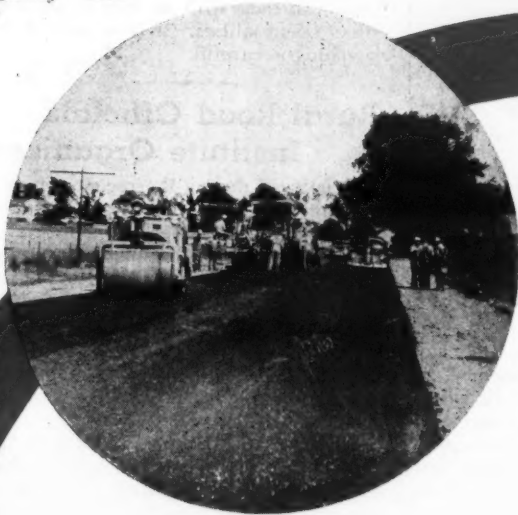
FISCAL YEAR 1943-44			
Make of Car	Total Maintenance	Miles Run	Cost Per Mile
13 Fords	\$17,891.45	746,796	\$0.0239
37 Chevrolets	30,528.44	1,260,333	.0242
2 Oldsmobiles	2,247.18	73,311	.0242
12 Plymouths	8,148.05	371,093	.0219
2 Mercurys	2,780.51	45,621	.0609
1 Studebaker	297.59	22,039	.0135
1 Hudson	599.71	27,542	.0217
1 Nash	565.01	32,396	.0174
FISCAL YEAR 1944-45			
9 Fords	10,196.17	599,018	.0170
48 Chevrolets	61,659.39	2,276,299	.0270
2 Oldsmobiles	3,392.40	107,929	.0314
12 Plymouths	13,636.27	529,823	.0257
3 Mercurys	4,310.10	122,213	.0352
1 Studebaker	602.38	33,561	.0179
2 Hudsons	1,836.60	52,675	.0348
1 Nash	948.93	48,585	.0195

Headquarters of the San Bernardino County, Calif., Highway Department are located in San Bernardino. Behind the county garage (at right) are the maintenance yard and auxiliary buildings. Highways in this county include city streets and desert roads. Below, a county motor-grader operator maintains a route in the county's eastern desert section. In its gravel-road work, screens (lower right) made to fit on truck beds are used to classify native material which is generally plentiful.



These road builders are far apart geographically but united in their choice of Texaco Asphalt

An Illinois road builder resurfaces a State highway with Texaco.



A Massachusetts road builder constructs airport runways with Texaco.



A Colorado road builder gives a secondary road a low-cost Texaco surface.

Look around the country and observe America's road builders at work—

One is building the runway system of a modern airport—another is constructing a section of state highway—a third is paving the principal street of a progressive city.

Note the impressive number of these road builders who have chosen Texaco Asphalt products for their projects. The types of Texaco construction on which they are working in-

clude heavy-duty pavements of the plant-mixed or penetration macadam type, low-cost asphalt surfaces of the road-mix or plant-mix type, and single or double surface-treatments.

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A Texas road builder paves an important city street with Texaco.



A Virginia road builder surface-treats a town road with Texaco.



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William H. Quirk, Editor
and Eastern Field Editor

Howard V. Pehrson
Central States Field Editor

Raymond P. Day
Western Field Editor

Olive E. Potter
Managing Editor

John P. Flynn
New Products Editor

Edgar J. Battenheim, President
George S. Cenever, Vice President
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Enough Roads for Peak Travel?

Despite the lack of any appreciable quantity of new automobiles for which a travel-hungry public has been waiting, all signs indicate that 1946 will show a record volume of highway travel, with motor vacation traffic getting under way in earnest in this first complete vacation season since the war. With gas and tire rationing now well in the past, the pent-up yearnings of the American motorist to seek the open road can be realized. How "open" will be that road is another matter. On the basis of a recent survey, the American Automobile Association forecasts that 60,000,000 vacationists will go farther and remain away longer than they did on pre-war vacations. Almost everyone who owns a car is planning a trip, and the volume of traffic, according to the survey, "is expected to be substantially larger than the huge total for 1941, which was the record pre-war vacation year".

While traffic can step up in a very short time to alarming proportions, needless to say the highways to carry this traffic cannot be built overnight. Even when the plans are ready, the contracts let promptly, and the work is rushed, it usually takes most of the construction season to finish a road.

From around the country come reports that the increased cost of road building is reducing the expected highway mileage to be constructed this year. One southern state received a bid for building a concrete road at a rate of \$108,000 per mile, compared with a pre-war normal cost of around \$70,000. A New England state has found that bids on many highway projects have run 50 per cent over the estimates because of the labor market and materials situation. A midwestern state has had to revise its estimates sharply upwards to follow the trend of rising costs, since it feels it can no longer postpone badly

needed construction.

A highly unionized eastern state says that in order to let contractors meet the union wage scale, highway costs will be 35 to 40 per cent higher. Another eastern state has rejected and re-advertised bids that were above department estimates in an effort to keep costs down, but the results of this practice were not encouraging. A state highway department in the southwest has several road contracts held in abeyance because of an increase of more than 35 per cent and on up to 159 per cent over construction prices of 1940-1941. The contractors concerned, however, pointed out that their bids were based on a 40 per cent increase in materials and a 300 to 400 per cent increase in repair parts for equipment. Uncertainty of labor supply, as well as higher labor costs, has affected bid prices.

Obviously we cannot construct highways today except at a greatly increased percentage over pre-war prices. What that percentage will be for state highway and Public Roads Administration officials to decide after a full appraisal of present-day costs. A "hold-the-line" policy in regard to costs is as urgent in construction as in other phases of our economy; it is important to remember that higher costs mean fewer roads. But the contractors' problems of increased costs of materials and labor must be taken into consideration, for, under the American free-enterprise system, to eliminate all profits from activity in any industry is to destroy the industry itself. Some middle course must be found, and found quickly, to make it possible for contractors to take contracts at a reasonable profit, and still insure maximum value for the taxpayer's dollar. Right now speed in expediting contracts is of the essence in order to get needed roads built as quickly as possible for peak travel.

Contractors Suffer Setback

An interesting, but possibly painful, decision affecting thirteen contracting firms was recently handed down by the State Supreme Court of Kansas. These firms were engaged on Kansas state highway construction contracts when war broke in December, 1941. The contracts, totaling \$1,656,555, were never finished, and the contractors subsequently brought suit to have them canceled, contending that the work could not now be finished at the prices under which the contracts were awarded. They lost out in the district trial court and the verdict was sustained in the appeal.

The contractors argued that they were unable to get sufficient materials, equipment, and labor to complete their work, since all three items were in great demand in building war plants

and training camps. Moreover, in December, 1942, the War Production Board stopped construction on all the projects. The State, on the other hand, claimed that some of the contractors, preferring the higher prices to be gained in defense work, neglected their contracts, especially after a request for an increase in their bid prices had been refused by the Kansas State Highway Commission. The doctrine of legal frustration is no excuse, the State asserted, for failure to fulfill the contract, and this reasoning was upheld by the Chief Justice in his opinion which read: "One who voluntarily executed with the State Highway Commission a binding contract which contained no provision excusing performance to construct a highway project, at a time when he knew a continual war was raging in

Europe and another in Asia, and when there were many indications that our nation would become a belligerent party in such wars, or knowing it had become a party, and realizing that the performance of the contract might be delayed or become more expensive or burdensome by reason thereof, is not entitled to have his contract canceled because of conditions resulting from the participation of our nation in such wars."

Moral to contractors: Read the handwriting on the wall, or the clauses in your contract, with an eye to all possible eventualities. If you cannot be psychic, be careful.

Rural Road Officials' Institute Organized

Organized during the recent convention of the American Road Builders' Association, the American Institute of Local Highway Administration took tangible form at a recent meeting of the organization committee in Washington. Operating under the auspices of the County Highway Officials' Division of the ARBA, the Institute will represent the local rural highway officials of the nation.

The new unit has for its purpose the assembling, disseminating, and emphasizing of information of all types bearing on local rural highway administration. It will comprise three members from each state, delegated by state associations of local highway officials. The general organization is patterned after that of the American Association of State Highway Officials.

Judge Gilbert Smith of Anson, Texas, is President of the AILHA. The organization committee, headed by Ed L. Almand, Atlanta, Ga., comprises Andrew L. Burrus, Union City, Tenn.; A. O. Cuthbert, Lansing, Mich.; D. Y. McDaniel, Waco, Texas; A. J. Thelen, Madison, Wis.; and H. A. Thomson, Drexel Hill, Pa.

Road Building Permitted Despite New Restrictions

Unlimited highway and bridge construction is permitted in the new Governmental order, issued March 26, which curtails all other construction drastically. It curbs all building construction in an effort to clear the way for the emergency housing program. Airport construction is likewise limited, being subject to the approval of the

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Civilian Production Administration.

Highway officials and the American Road Builders' Association were mainly responsible for the exception made of highway building in the regulation. They maintained that road work should be exempt because of the critical condition of our highways and because it requires but little of the materials needed in the housing program. Much the same sentiment was expressed in regard to the airport program, and top-rank officials are working to effect a change in its status under the new order.

Fire-Protection Group Marks Golden Jubilee

Fifty years of devotion to greater safety is being marked by the National Fire Protection Association at its Fiftieth Anniversary meeting in Boston, Mass., June 3-7. The organization was started in 1896 to promote the science and improve the methods of fire protection and prevention, to obtain and circulate information on these subjects, and to secure the cooperation of its members in establishing proper safeguards against loss of life and property by fire.

The organization is supported by the dues of its members, which include over 150 national organizations, and more than 10,000 individuals in 37 countries. The Association sponsors Fire Prevention Week, publishes safety literature, establishes codes for fire prevention, and in many other ways works to promote greater fire safety. Its headquarters are in Boston at 60 Battery Street.



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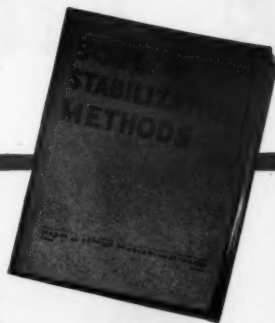
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Channel Maintained By Two Dredge Types

Hopper Dredges Dig and Haul Material to Holes Excavated in River Bottom; The Dredge New Orleans

MAINTAINING a deep-water channel for 104 miles in the Delaware River from Philadelphia to the sea is a never-ending task, but one which is handled in smooth fashion by the U. S. Engineer Department with a fleet of eight dredges, five of the hopper type and three pipe-line dredges. For 10 miles along the Philadelphia water front in the curving stretch from Petty Island to the Navy Yard, just above the confluence of the Schuylkill River with the Delaware, a 35-foot channel is maintained for a 1,000-foot width. Below the Navy Yard, and continuing 65 miles further downstream to the Liston range, a 37-foot channel is held, 800 feet wide on the straightaway and increasing to 1,000 feet on the turns. Beyond this point the channel deepens to 40 feet, and has a minimum width of 1,000 feet for the remainder of the distance to deep water in the ocean.

At the lower or sea end of the channel the river bottom is sandy and is not too difficult to control, while above the Navy Yard past the long row of commercial docks, a channel is maintained without undue trouble. Below the Schuylkill, however, the dredges must keep constantly at work to preserve a deep enough passage for large vessels. Here the river bottom is mostly a soft, muddy ooze caused in large part by deposits of culm, a shaly coal dust, which is carried down the Schuylkill from the Pennsylvania coal fields and spread over the Delaware bottom as far as 20 miles below the confluence of the two rivers. The light weight of this material,

By WILLIAM H. QUIRK,
Editor

around 74 pounds to the cubic foot, is only about 12 pounds heavier than a cubic foot of water, thereby requiring continual dredging to keep it out of the channel where it is deposited gradually while being carried along in suspension.

Hopper Dredges Required

The type of material was one of the factors which determined the use of sea-going hopper dredges for channel maintenance in the Delaware River. If clamshell or pipe-line suction dredges were employed to dredge the bottom, the removal of the soft mud to full channel depth in some pattern of strip cutting would only result in the holes being filled up again almost immediately on either side of the excavation, since the sides of the cuts would not be sufficiently stable to withstand sliding and oozing. An additional factor was the impossibility of using pipe-line dredges in the congested industrial region below Philadelphia. Furthermore, spoil areas, where dredged material would have to be deposited, are few and far between along this river which is one of the most intensively developed arteries of commerce and industry on the Atlantic seaboard.

Highly satisfactory channel maintenance is accomplished with self-propelled hopper dredges which deepen the channel slightly at each pass as they move over the shoals that have formed, and then carry the material in their hoppers to submerged dumping areas, great holes in the river bed which have been excavated for this purpose. These holes are located near low unoccupied stretches along the shore, where the material is wasted after being pumped from the dump holes by pipe-line suction dredges in a rehandling operation.

The fleet of hopper dredges includes the Clatsop, Delaware, Rossell, Raritan, and the New Orleans. The Clatsop, Delaware, and Raritan have a drag on each side which loosens the river bottom sufficiently so that the material is sucked up through the intake pipe located directly above the flat metal drag. The dredged material is pumped into two hoppers or holds, one forward and the other aft. The most efficient of the dredges, the New Orleans, has only one drag at the end of a long arm which pivots in a slot cut into the stern. Above the drag are two intake pipes through

(Continued on page 69)

The hopper dredge New Orleans is one of a fleet of dredges used by the U. S. Engineer Department to maintain the channel in the Delaware River from Philadelphia to the sea. Lower left, in the stern of the New Orleans is a 70-foot-long drag weighing 85 tons which has a dredging depth of 20 to 45 feet. Lower right, this drag carries two 28-inch intake pipes, each of which is equipped with a vent tube which aids the suction. At left, this view shows the outside water-discharge vents of the New Orleans.

C. & E. M. Photos

Pipe-Line Dredges Move Material From Underwater Holes to Area on Shore; The General Gillespie

THE second step in the dredging to maintain the channel in the Delaware River is the removal of the material deposited by hopper dredges (see accompanying article) in dumping areas excavated in the river bottom. Pumping this material from the underwater holes are three U. S. E. D. pipe-line suction dredges, the Alabama, Gulfport, and General G. L. Gillespie, one dredge assigned to a pair of the twin holes. The General G. L. Gillespie dredged material from one area located off Hog Island, below Philadelphia, and pumped it through 7,744 feet of line to designated locations on shore.

Hog Island, used as a shipbuilding center in World War I, is low and flat, with the average ground elevation about 2 feet above sea level. In late years the island was all but abandoned until the second World War began, when ammunition dumps were built along its shore, and the spoil banks of dredged material were used as protection walls. Now hydraulic fill is being placed over the island and will eventually cover it to a 10-foot depth, raising its elevation to plus 12, thereby eliminating a mosquito hole of giant dimensions.

The General Gillespie

The Gillespie is a sturdy craft, 150 feet long, with a 37-foot beam and a depth of 11½ feet. With a steel hull and wooden superstructure, it has a light draft of 9½ feet and displaces 1,192 long tons. Built in 1915 by the Ellicott Machine Corp. at Baltimore, Md., at a cost of \$104,288.71, the Gillespie has accommodations for thirteen officers and a crew of thirty-four who are divided up into three shifts. The dredge burns fuel oil for its steam boilers, does not drive itself, and has a 23-inch-diameter suction pump.

Located aft and enclosed within deck-high bulkheads is the boiler room, the powerhouse of the dredge. Here are the four Babcock & Wilcox water-tube marine boilers, generating 225-pound steam pressure, with a total of 6,052 square feet of heating surface and two oil burners. Alongside the boilers are two 21,000-gallon fuel tanks to supply oil to the burners at the rate of 8,000



C. & E. M. Photo
The open-type cutter head of the dredge General Gillespie is 6 feet in diameter with five blades, and is driven by an Ellicott two-cylinder horizontal steam engine.

gallons every 24-hour day.

Dredge Machinery

Just forward of the boiler room and on the center line of the dredge is the Skinner Uniflow main engine with six cylinders, 16-inch diameter x 16-inch stroke, having an indicated horsepower of 1,750 at 325 rpm, and operating at 210-pound steam pressure. After the steam leaves the engine, it is changed back to water by an Ingersoll-Rand two-pass condenser. As the water is covered with a lot of oil and grease, it is sent through two filters, consisting of a series of 70 to 80-mesh screens and a mat composed of diatomaceous earth and long fiber asbestos, which remove all foreign material from the water so that it can again be used in the boilers.

In front of the engine and connected to it by a 10-inch direct-drive shaft equipped with Kingsbury thrust and pump studding bearings is the main 23-inch suction pump, with an 84-inch 5-vane impeller weighing 6 tons. Built into the 23-inch intake line forward of the pump is a manhole whose lid can be removed by a Yale 1-ton jib crane if the line becomes clogged with some large object such as a rock or tree stump. Also overhead are four other Yale hoists, 5, 6, 8, and 10-ton, which are used by the crew when replacing parts of the pump. The liners in the pump last about seven days, while the casings, which are 2¾ inches thick, are good for about five months' work when mud is being pumped, but last for only a couple of weeks when the material is sand or gravel.

At the forward end of the deck housing, five winches are strung out in a row across the beam of the dredge. These Ellicott hoists operate off a line shaft driven by an 8 x 12-inch steam engine at 110 hp. The two outside hoists operate the two stern spuds which are made of cast steel, 34 inches in diameter, 70 feet long, and weigh 18 tons each. Located outside the hull, each spud is held in place by two bands or gates, one placed 2 feet below the water line and the other 5 feet above the deck. The port spud is the digging spud and is lowered when the dredge is pumping.

The two intermediate hoists swing the dredge from side to side on breast cables which are secured to 3,500-pound anchors off the port and starboard bow. The total length of line is about 1,200 feet. The center hoist raises or lowers the 67½-foot ladder through a system of sheaves and cables running over the top of a 30-foot A-frame at the bow of the dredge. At the forward end of the ladder is an open-type cutter head, 6 feet in diameter with five blades, driven by an Ellicott two-cylinder 11 x 14-inch horizontal steam engine at 26 rpm and having 180 hp.

(Continued on next page)



Pipe-Line Dredge Gillespie Used to Maintain Channel

(Continued from preceding page)

Pumping Operations

With this equipment, the Gillespie can dredge at depths of from 10 to 39 feet, with a lateral range of from 100 to 250 feet across a cut. It works lengthwise of the 150 x 500-foot hole, taking out strips 7 feet wide and about 8 to 9 feet deep on the average, as it swings back and forth across the dump area. In moving over the full length of the hole the side anchors usually have to be shifted twice. The general procedure is to have the Gillespie work in one basin for a day, and then shift over to the adjoining basin the next day, with the hopper dredges unloading at the empty hole. In this way neither cut is permitted to get too full at any one time.

Gages in the pilot house at the forward end of the dredge show an average vacuum of 15 to 25 inches on the 23-inch intake line, and an average pressure of 60 to 80 pounds to the inch on the 20-inch discharge line. Another gage indicates the depth at which the cutter head is working. When working in these holes, the dredge pumps from 35 to 50 per cent solids with the material dredged showing the following classifications:

Mud	70 per cent
Silt	20 per cent
Sand	6 per cent
Gravel	4 per cent
	100 per cent

The dredged material leaves the pump on the port side through a 20-inch line which rises to deck level, makes a turn, and proceeds to the stern along the port side of the dredge within the deck housing. At the stern the line makes two right-angle turns in order to leave the craft at the center between the two spuds.

Auxiliary Equipment

Grouped around the engine at the bow of the Gillespie is sundry auxiliary equipment, including a G-E 25-kw generator to furnish electricity for lighting, and a Pyle-National 15-kw generator in reserve for emergencies. Machinery repairs are made on a 36-inch x 20-foot lathe and a Rockford 20-inch shaper, both driven from an overhead line shaft

turned by a Troy steam engine. Operated by individual electric motors are other pieces of equipment including a 10-inch grinder, a Sibley 12-inch drill press, and a Beaver pipe and bolt-threading machine. At the rear of the engine is a work bench equipped with two vises.

The boiler room and fuel-oil tanks are protected from fire by a 9-bottle fire-smothering system of carbon-dioxide gas. To the stern of the boiler room are two compartments, one containing an ice machine which makes 1½ tons of ice every day to supply the food refrigerators, and the other compartment used as a blacksmith shop. This room has a 3-foot-diameter circular forge, a 250-pound anvil, and a work bench with an 8-inch vise. On the stern deck outside the blacksmith shop is a Lincoln



C. & E. M. Photo

The 20-inch floating line from the General Gillespie is carried on 34-foot-long pontoons, the first two of which are floated by three and four cylinders, respectively, and are used as storage rafts for supplies.

350-amp electric welder.

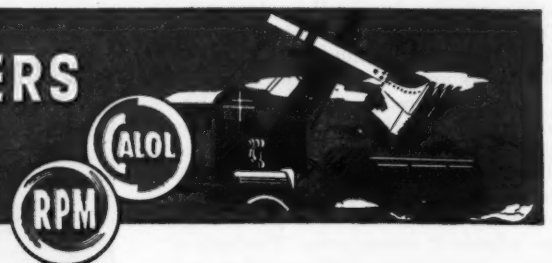
Floating Line

At the very stern of the dredge the discharge pipe is equipped with a flap valve, a safety measure to prevent the dredge from being flooded should the pump suddenly fail and water from the

floating line reverse the direction of its flow. In such a case the valve would be closed, stopping all movement of material through the outlet pipe. The 20-inch discharge pipe passes from the dredge to the floating pontoon line by means of a system of flexible ball-joint

(Concluded on next page)

STANDARD ENGINEERS NOTEBOOK



Tacky oils cut gear lubrication costs

Where bearings and gears must carry an extreme pressure load for a relatively long time because of slow operation, Calol Vistac Oils are recommended.

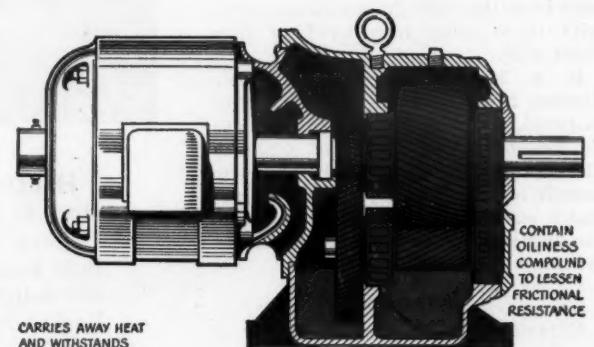
They are viscous and tacky, and have unusual ability to remain on bearing surfaces and resist film breakdown. Thus, a smaller quantity is required and many gear sets can be lubricated less expensively with Calol Vistac Oils than with ordinary oils.

A special oiliness ingredient in Calol Vistac Oils gives them low operating torque, thus minimizing frictional resistance while the extreme pressure additives used insure efficient operation under extremely heavy loads. They withstand high operating temperatures and readily carry away heat.

There are six grades of Calol Vistac Oils, providing the correct lubricant for all types of heavy-duty industrial reduction gear sets. Also excellent for the lubrication of air tools, they atomize quickly, are stable and minimize vapor trouble.

CALOL VISTAC OILS ARE
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AND REMAIN ON
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CALOL VISTAC OILS COME IN SIX
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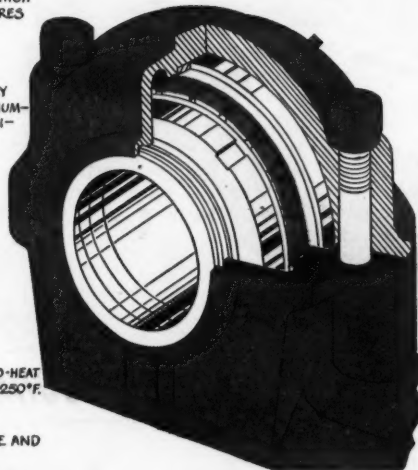
CARRIES AWAY HEAT
AND WITHSTANDS
HIGH TEMPERATURES

CALOL S.A. GREASE ASSURES
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CALOL S.A. GREASE MAY
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TEMPERATURES OVER 250°F.

MINIMIZES DRIPPAGE AND
LEAKAGE TROUBLE



New grease lubricates in extra hot conditions

Developed especially for bearings that must operate in radiated heat, new Calol S. A. (sodium aluminum) Grease has proved satisfactory in temperatures over 250° F. It has been tested by many operators on working machines in the field. In addition, it was given a series of tests in the Navy Ball Bearing Machine, operated at 10,000 rpm, with bearing temperatures maintained at a high degree.

Calol S. A. Grease is made from a special type base and selected oils that give it high heat-resistant qualities. In use, these qualities assure minimum drippage or leakage from bearings.

Although Calol S. A. Grease is ideal in a multiplicity of services, it is specifically adapted to the lubrication of low, medium and high speed anti-friction bearings used in all types of machines.

Made in three grades, 00, 0, and 1, by Standard of California, Calol S. A. Grease is available in 35-, 108- and 420-pound containers.

For additional information and the name of your nearest Distributor, write Standard of California, 225 Bush Street, San Francisco 20, Calif.; The California Oil Company, 30 Rockefeller Plaza, New York 20, N. Y.; The California Company, 17th and Stout Streets, Denver 1, Col.; Standard Oil Company of Texas, El Paso, Texas.

Chip-It-Over

is the ideal machine for the distribution of all fine material used in road building and maintenance. Can be used with any dump truck—no extra attachments being necessary. Can be mounted on any truck and ready to operate in four minutes.

Manufactured by

The Burch Corporation

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Equipment Since 1875

FOR EVERY JOB A STANDARD OF CALIFORNIA TEST-PROVED PRODUCT

Dredge Gillespie Aids Channel Maintenance

(Continued from preceding page)

connections. The first and second pontoons from the dredge are floated by three and four cylinders respectively, for they are used as storage rafts where some supplies are kept, and the first pontoon also holds a dory swung from a pair of davits.

The rest of the floating line consists of 40-foot lengths of 20-inch pipe with each length supported on a pontoon made up of two cylinders, 4 feet in diameter and 24 feet long, connected at each end by a 12 x 12-inch timber strongback 28 feet long. The ends of these timbers in turn are joined by other timbers, 12 x 12-inch x 14 feet long, with a steel saddle at the center on which the discharge pipe rests. Wooden saddles are bolted to the top of the pipe to serve as a foundation for the wooden catwalk made up of two 2 x 10's with a wooden hand rail on each side. The catwalk also carries a telephone line to provide communication between the dredge and the shore crew.

From the dredge this floating line runs out 320 feet to a raft floated by four cylinders on which a 90-degree elbow connection has been set so that this section of line can be swung around when the dredge moves to pump from the adjoining dump area. The raft is held in position by a 2,500-pound anchor controlled by a winch on the raft. From the raft a floating line 600 feet long leads to the shore and is kept from swinging with the current by means of four 1,000-pound anchors, each attached to an individual hand winch set up along the catwalk. This portion of the line can swing 250 feet in either direction, according to which hole the dredge is working.

Land Line

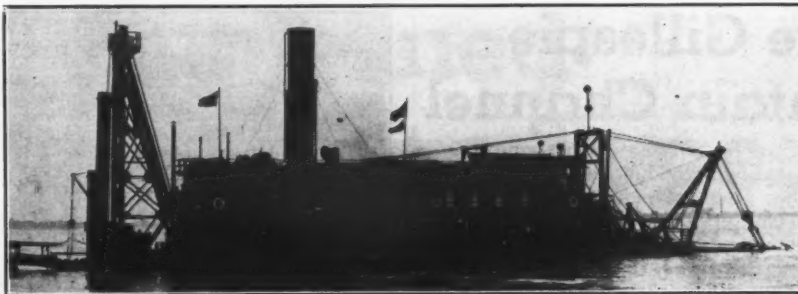
When land is reached, the pipe used is 20 inches in diameter in 16½-foot lengths connected with slip joints, and runs out to 7,000 feet in length. On Hog Island not far from the shore the pipe crosses a wooden bridge built over the tracks of the Pennsylvania Railroad, involving a lift of 34 feet. The water from the hydraulic fill flows back into the river through a sluice which retains any solids that may still be carried. A 1,500-hp electric-driven booster pump is now being built which will be placed on shore, enabling the shore line to be extended to 12,000 feet beyond the booster.

At the end of the line are two sets of valves permitting three different discharge lines which empty against 6-foot-square baffle boards. These baffles are made up of six 1 x 12-inch boards with extra reinforcement at the center where the full force of the discharge is felt. A crew of from eight to twelve is used in setting pipe during the daytime, with three other men working each night shift.

In a 24-hour day, the Gillespie dredges from 20,000 to 22,000 yards of material. Auxiliary craft working with the dredge include the Dover, a 100-hp diesel tug; the Wildwood, a 30-hp launch; a derrick barge; a supply barge; and a water barge that hauls water to the dredge from the Philadelphia water system.

Personnel

Captain J. D. Mahoney is Master of the General G. L. Gillespie, and J. A. Riley is Chief Engineer. Its work is part of the channel-maintenance operations of the U. S. Engineer Office in Philadelphia, Pa., of which Col. F. F. Frech, C.E., is District Engineer. Captain N. B. Scarborough is in charge of all dredging operations, assisted by E. E. Krauss.



U. S. E. D. Photo
The 150-foot-long dredge General G. L. Gillespie is one of three pipe-line suction dredges used by the U. S. E. D. for channel maintenance in the Delaware River.

Unit Provides Warmth For Accident Victims

First aid on the job is one of the "musts" on any construction project. Much as we should like it otherwise, accidents do happen; therefore, a first-aid kit is an essential part of all job equipment.

Frequently in first aid, one must supply warmth to treat the victim for

shock. To meet this need, the Mine Safety Appliances Co. has announced a new emergency heat source, the Redi-Heat Block. This self-contained unit provides non-liquid heat for an hour at a time, and requires only a minute to reach top temperature.

The unit comprises a block which weighs only 22 ounces and measures 3½ x 4 x 1½ inches. It is made of lightweight metal that has high heat-trans-

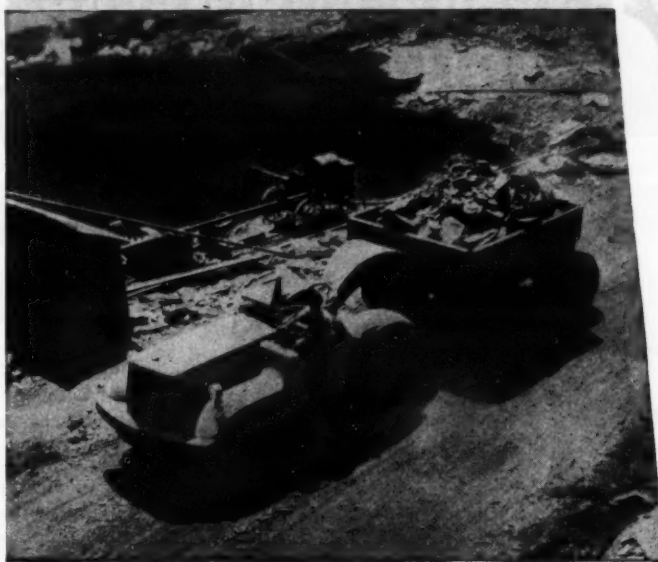
fer value, is encased in a special cover, and contains a replaceable Redi-Heat charge. The charge has a newly developed chemical compound and is activated when placed within the block. It is sealed and is not adversely affected by lengthy storage periods or other conditions, MSA says.

For further details and Bulletin FA-92 describing the Redi-Heat Block, address Mine Safety Appliances at Braddock, Thomas, and Meade Sts., Pittsburgh 8, Pa. Mention this news item.

PCA Forms New Unit

The establishment of a Conservation Bureau, with Ezra C. Wenger as its Manager, has been announced by the Portland Cement Association. The bureau, with headquarters in Chicago, will correlate technical information and assist users of concrete. Mr. Wenger has been Regional Highway Engineer for the Association in the midwest for the past 11 years.

Rubber-Tired for HIGH-SPEED HAULING

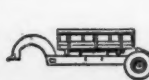


Forged-Trak Wheels for ADVERSE FOOTING



HAULING EQUIPMENT to meet job needs—that's the Athey story in a nutshell. For long, high-speed hauls, there's the 10 yard, 2-Way Dump Athey PD-10 Rubber-Tired Trailer; built to match the speed and capacity of the DW10 Tractor. For rough going and adverse weather, there's the complete line of rugged Athey Forged-Trak Trailers that keep your toughest jobs going on schedule. It's tracks or rubber with proven Athey products—machines to fit job requirements for lowest costs, biggest profits. Check with your Athey—"Caterpillar" Dealer before you buy any hauling equipment—be sure it is custom-selected for your hauling needs. See him today!

ATHEY PRODUCTS CORPORATION, CHICAGO 38, ILL.



All-Job Hauling Units



Athey
DEPENDABLE LOADING
& HAULING EQUIPMENT

New Distributor Firm Organized in Wisconsin

Announcement has been made by George J. Dimond and John D. Colloton of the organization of a new equipment-distributor firm known as the Dimond-Colloton Equipment Co., with temporary headquarters at 633 No. Water St., Milwaukee 2, Wis. This company will handle the sales and service of construction and industrial equipment.

Mr. Dimond, a well known figure in the construction industry, was associated for many years with the Koehring Co., resigning the post of Sales

Manager of that firm in May, 1944, to become Vice President in charge of sales for the Insley Mfg. Corp. Last September Mr. Dimond left that position to join Mr. Colloton in the organization of their own company. Mr. Dimond has been active in the Manufacturers' Division of the American Road Builders' Association and in the Mixer Manufacturers Bureau of the Associated General Contractors of America. Mr. Colloton has served with the Milwaukee County Highway Department and with a number of contractors in his native state of Wisconsin, and also with the Standard Oil Co. of Indiana. For

the past four years he has been in the equipment-distributor business in Chicago.

Among the companies to be represented by the new firm are the T. L. Smith Co., the Foote Co., Inc., and the Gorman-Rupp Co.

Owens Resumes Duties

The return of R. C. Owens to his post as Secretary to the two firms has been announced by The Osgood Co. and The General Excavator Co., both of Marion, Ohio. He has seen three years' service with the Navy.

Rubber-Tired Road Roller

The various features of the 5-wheel Cemco Flat-Iron rubber-tired road roller, which is made by the Construction Equipment & Mfg. Co. under the Flat-Iron Roller Co.'s patent, are outlined in a 4-page leaflet issued by the firm. Drawings and charts show the principle, construction, and mode of operation of the unit.

Copies of the folder can be secured by addressing Construction Equipment & Mfg. Co., 2434 University Ave., St. Paul 4, Minn. Mention this C&EMonthly report.



*What makes this statement unusually significant is the fact that McNutt Bros. have been 100% "Caterpillar" users since 1929. Ten "Caterpillar" Diesel D8 Tractors, one Diesel Forty, and four Motor Graders constitute their present tractor-grader equipment.

The job pictured is a 4½-mile highway relocation involving the moving of 843,000 yards of earth.

USERS write the BEST ADS

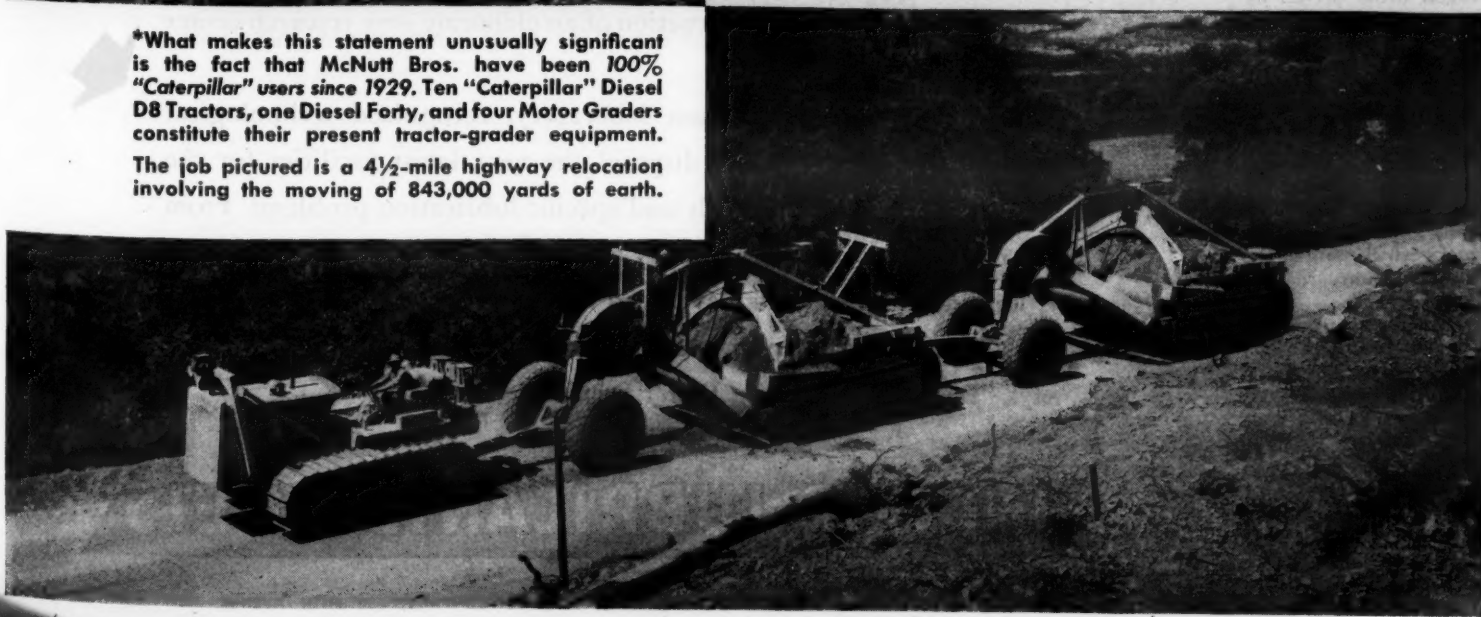
"We have always
considered 'Caterpillar'-
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ENGINES • TRACTORS
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EARTHMOVING EQUIPMENT



Highway Cut Widened To Halt Rock Slides

Two Benches Made on Each Side of 75-Foot Cut as a Safety Measure; Angle of Slopes Also Flattened

† THE danger from falling rock that occurred every spring in the deep 75-foot cut on U. S. 50, 1½ miles west of Shoals in Martin County in southwestern Indiana, was eliminated last summer by some heavy excavation whereby the nearly vertical backslopes were flattened and benched in an operation that required the removal of about 47,000 cubic yards of material, most of which was rock. This improvement, in what is known as Peek's Cut, was done by the contracting firm of Smith & Johnson of Indianapolis, Ind., on its low bid of \$51,000 to the Indiana State Highway Commission. Work was started on the project in January, 1945, but because of the extreme amount of rainfall in the first half of the year it was not finished until July 25, nearly seven months being required to provide the 117 working days needed for the job.

Built originally in 1931, this important east-west highway across southern Indiana had an 18-foot concrete pavement that was widened 3 feet on each side in 1944. It is interesting to note that when the bids were let for the initial construction, which was included in a 6-mile section, the contractors were permitted to bid this portion of the work either as an open cut or tunnel, and the award was made for the open-cut method. No bids were received on the alternate tunnel construction.

The ¾ to 1 slopes, part of the original construction, were much too steep to retain the sandstone and shale rock after alternate periods of freezing and thawing in the late winter and early spring and the danger of slides was so great that Highway Commission engineers decided that the slopes should be flattened and also benched. The recent contract called for a roadway section measuring 50 feet from ditch line to ditch line, with 10-foot shoulders on each side of the 24-foot concrete pavement. From the ditch line the new slopes are built ¾ to 1 to a point 25 feet up, where a 10-foot bench was excavated into the side of the cut. Another 10-foot bench, 25 feet higher, runs the length of the cut at that level, while the slope for the remaining distance to the top is also ¾ to 1.

Rock Work

Work was started on the north side of the 800-foot-long cut where an old county road crossed the ridge at this point. Holes for dynamite charges to blast the rock were drilled by jackhammers and wagon drills driven by two air compressors, a Worthington and a Gardner-Denver. Since traffic had to be maintained on the road below, care was taken that not too much rock was dislodged at a time, thereby obstructing the highway. The rock was taken down in lifts of from 8 to 12 feet, and from 100 to 200-foot sections at a time. A Koehring ¾-yard shovel worked along the top of the cut, loading five Ford 1½-ton dump trucks which hauled the material down the old county road to widen the fills along U. S. 50.

The total length of this contract was 1.0 mile, and as the cut is only 800 feet ample area was provided at either end for disposal of the surplus rock, besides serving the very good purpose of widening the shoulders of these fills. On the south side of the cut, where there was no such convenient road to the top, the rock was blasted in the same manner as before, and then pushed over the side by a Caterpillar RD8 tractor with bulldozer. The material was picked up by the shovel working along the ditch line



The hazard of slides and falling rock in a deep cut on U. S. 50 in Indiana has been eliminated by flattening the backslopes. Left, blasted rock is removed to trucks as a flagman watches out for traffic. Above, the flattened ¾ to 1 slopes.

and loaded into the trucks. This method was followed for the lower benches on both sides of the cut. A Caterpillar power grader with a 12-foot blade finished the shoulders on both cut and fill.

Personnel

William Niese was Superintendent for the contractor, Smith & Johnson, and employed a crew of 16 men including 3 equipment operators, 5 truck

drivers, and 8 laborers. Paul Vermilion was Project Engineer. The contract was under the direction of the Vincennes District of the Indiana State Highway Commission which has Russell Williams as District Engineer, and C. S. McKee as Assistant District Engineer of Road Construction. The Construction Division of the Commission is headed by Carl E. Vogelgesang, Chief Engineer.

Timber Hangar Designs

Airport managers, county engineers in charge of airports, and contractors active in such work will find interesting a new booklet, "Low Cost Housing for Small Airplanes", available from the Timber Engineering Co., 1319 Eighteenth St., N. W., Washington, D. C. The booklet lists ten advantages of building wood hangars, and gives layouts of low-cost unit and multiple-unit hangars and repair shops.

Western Dealer Moves

Larger quarters on Ferry Street near 7th in the Port of Oakland area have been taken over by the Soule Equipment Co., distributor in northern California for LeTourneau, Bucyrus-Erie, Diamond Iron Works, Gray Co., American Rubber, and Briggs & Stratton. Comprising about 5 acres, the new site has 31,950 square feet of roofed space, and a railroad spur. Howard L. Stille is General Manager.



MOVING ahead with the resumption of peace-time industrial activity, Sinclair assures its customers of still greater product quality and performance with construction of an elaborate new research center at Harvey, Illinois.

In this great petroleum laboratory, recognized technological experts will have at their disposal the very latest facilities for the solution of the most difficult and specific lubrication problems. From the research work here, you may expect consistently top performance from Sinclair lubricants developed for every type of industrial use.

This research center is evidence that Sinclair means it when it says "Better Products . . . Better Service."

SINCLAIR LUBRICANTS-FUELS

FOR FULL INFORMATION OR LUBRICATION COUNSEL WRITE SINCLAIR REFINING COMPANY, 630 FIFTH AVENUE, NEW YORK 20, N. Y.

Spreader, Finisher Data In Illustrated Booklets

Built to cope with the harsh, dry mixes used in today's concrete construction of roads and airports, the Blaw-Knox concrete-paving spreader with an automatic transverse blade is described in a new brochure. A companion booklet illustrates the spreader's partner in work, the Blaw-Knox finishing machine.

When operated as a team, the two units are said to produce record-making quantities of modern high-quality paving at a low cost. The booklets, one of 18 pages, the other of 14, combine diagrams, charts, photographs, specifications, and text to highlight the features of the machines.

Copies will be mailed on request. Mention CONTRACTORS AND ENGINEERS MONTHLY when writing the Blaw-Knox Division, 2067 Farmers Bank Bldg., Pittsburgh, Pa.

J. F. Heil Succeeds Father

The election of Joseph F. Heil to succeed his father, Julius P. Heil, as President of the Heil Co., Milwaukee, has been announced. The elder Heil, founder of the firm, will retain active participation in its affairs as Director and Treasurer. Joining the firm in 1923, the new President spent eight years training in virtually all phases of the business before becoming a Vice President in 1931. Shortly after his father was elected Governor of Wisconsin in

1938, he advanced to the Executive Vice Presidency.

The firm has also announced the appointment of T. W. Boyle as District Manager for the sale of all Heil products in Missouri, Nebraska, Iowa, Kansas, and Wyoming. His office is in the Board of Trade Building, Kansas City, Mo.

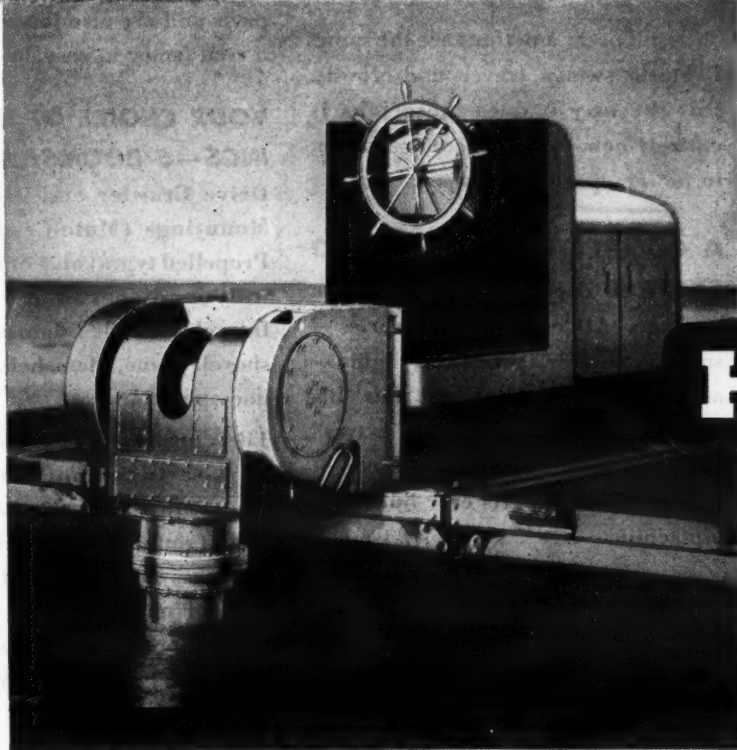
U.S. Rubber Names Spoerl

Following the sudden death of Herman A. Everlien, the United States Rubber Co., New York City, has named Walter F. Spoerl as General Sales Manager of the Mechanical Goods Division. With the firm 43 years, Mr. Spoerl has been serving as Merchandise Manager of the Mechanical Goods Division.

H. O. Penn Co. Reorganized

Following the recent death of Hamilton O. Penn, President of the Associated Equipment Distributors and of the H. O. Penn Machinery Co., New York City, the control of the company has been acquired by Ralph L. Johnson and Stuart A. Wade, formerly Vice Presidents of the firm.

Under the reorganization of the business, Mr. Johnson assumes the Presidency, and Mr. Wade the post of Executive Vice President and General Manager. Horace C. Ruggles remains as Secretary, and Harriet Plotkin as Treasurer. Mr. Wade will retain, in addition to his new duties, those of General Manager of the firm's Connecticut Division.



MURRAY & TREGURTHA

has been known for the manufacture of dependable, efficient marine equipment. All the experience, knowledge and skill gained during this continuous service have been devoted to a new, revolutionary propelling and steering equipment:

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HARBORMASTER

Today we can guarantee all models of these compact, heavy-duty Units, ranging from 20 H. P. to 330 H. P., to be the most efficient propelling and steering equipment you have ever had! They deliver more thrust per horsepower than any other conventional method! They give you

the ultimate in maneuverability (360° control), unequalled peaks of maintenance and operating efficiency! During the war and at present all over the world these remarkable, economical marine abilities have been and are being proved. Write today for complete information on all "Harbormaster" models and installations . . . you can always depend on Murray & Tregurtha's "Harbormaster".

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New York State Enlarges Its Research Facilities

A new Testing and Research Laboratory is to be built at Syracuse University by the New York State Department of Public Works in order to replace the present inadequate facilities in Albany, Superintendent Charles H. Sells has announced. To be run in cooperation with the University, the Laboratory is needed to meet the demands of the coming construction program. Present fa-

cilities at Albany are capable of caring for a yearly construction program of about \$35,000,000, which is but one-fourth of the work projected for 1946 alone.

When built, the new structure will house physical, chemical, concrete-testing, and soil-testing laboratories, machine shop, and freezing and thawing equipment. According to plans, the facilities of these new laboratories will be available to local civil units. To be erected on a 35-acre tract of the Uni-

versity campus, the structure is designed to make future expansion possible and will have an overall floor area of 39,240 square feet.

Koppers Names Somervell

The election of General Brehon B. Somervell as President of the Koppers Co., Inc., has been announced by J. P. Williams, Jr., Chairman of the Board. The General commanded Army Service Forces during World War II.

Specialized Cutters

Circo specialized cutting tools for wood, metals, and other materials are described in a recently issued 4-page folder. Among the items shown is a grooving and dapping tool for timber-connector work. Heavy-duty boring tools and other cutters for shop use are also presented. Copies of this folder may be obtained by writing the Circo Tool Co., 617 N. 2nd St., Milwaukee 3, Wis., and mentioning this news item.

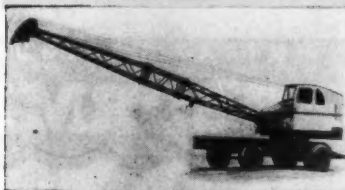
Thew • LORAIN



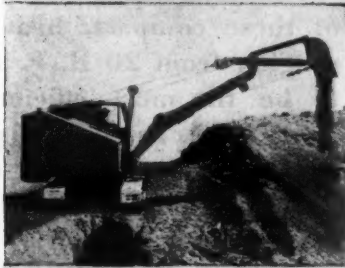
TL-20 Shovel on 6x6 Moto-Crane Mounting.



TL-20 Dragline on 3-speed chain drive crawler.



TL-20 Self-Propelled Crane, 4 or 6 wheels.



TL-20 Hoe. Coosmoach boom for maximum digging.

AND WE DO MEAN NEW! The TL-20 is the first really new "postwar" shovel and crane — not a delayed prewar unit, not a war-built unit — but new and up-to-the-minute from mounting to boom head.

True, all basic functions are the same. It hoists, swings, travels and crowds. But the way it does these jobs is entirely new — in engineering design, in power, speed and output.

A COMPLETE PACKAGE—NO EXTRAS! Each TL-20 is a complete package. All essential accessories — such as starter, generator, lights — are built into the standard unit. It's not a stripped-down unit; no "extras" to buy. It has the largest number of interchangeable parts ever built into a machine.

UNIT ASSEMBLY THROUGHOUT! Each major component — clutch shaft, engine, hoist shaft, cab, crawler propelling mechanism — can be removed

and interchanged as a complete unit. The 5 clutches which control all machine operations have identical working parts and are also interchangeable — a vital factor in easy, low-cost service.

YOUR CHOICE OF 10 MOUNTINGS — 5 BOOMS! 2-Speed Chain Drive Crawler and 9 Rubber-Tire Mountings (Moto-Crane and Self-Propelled types) on 4 or 6-wheel units with or without front wheel drive. 5 Interchangeable Boom assemblies for shovel, crane, clamshell, dragline or hoe operation.

There are dozens of other time-saving, work-saving, money-saving advantages with the TL-20 that make it a real "Contractors' Machine" — a machine easy to understand, easy to service and maintain. See your nearest Thew-Lorain distributor about the postwar TL-20 — the newest thing in the ½ yd. class.

THE THEW SHOVEL COMPANY
LORAIN, OHIO

It's FREE...
and full of
facts!



The complete, illustrated story on the new TL-20 is contained in this booklet... Ask your local Thew-Lorain distributor for a copy or write The Thew Shovel Co., Lorain, Ohio.

TL-20

AVAILABLE WITH 5 INTERCHANGEABLE BOOMS

Bulletins on Equipment For Concrete Products

Machinery for concrete products is described in bulletins available on request from the Stearns Mfg. Co., Inc., Adrian, Mich. The firm manufactures the Joltcrete block machine, capable of producing up to 5,000 blocks a day; the Clipper Stripper, which will produce 2,000 blocks daily; and Stearns batch mixers and skip loaders. The mixers are available in either stationary or

truck-mounted models that have capacities of 12, 18, 28, 42, or 50 cubic feet, with either pulley or V-belt drive. Skip hoists in corresponding sizes are also available.

When writing to the company for literature, just refer to this item.

Caterpillar Assignments

C. A. Matheny, formerly a Superintendent at the Peoria plant and Works Manager of the Caterpillar Military

Engine Co., has been named to head a newly organized division of the Caterpillar Tractor Co. This new department, a section of the general planning department, will screen out ideas for improving the firm's manufacturing processes.

Consultation in the Caterpillar soil-erosion program is to be handled throughout the South by J. Irwin (Jeff) Davis, Sr., who has been serving as District Representative in Florida and part of Georgia. Farm-pond building, ter-

racings, and land clearing will come within the scope of his studies and promotional work.

In Wickwire Spencer Post

Harry Bottomley has been named sales representative for the southern Pennsylvania and Virginia territories of Wickwire Spencer Steel, a Division of the Colorado Fuel & Iron Corp. Recently released from service, Mr. Bottomley succeeds H. C. Stults.

does it again!

NEW / In ideas
In design
In features
In performance

The **20**
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MODERN FEATURES GALORE

- ★ Anti-Friction Bearings
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- ★ Drop Forged Treads
- ★ "Full Circle" Steering
- ★ Positive Independent Cable Shovel Crowd



BOOMS AND CHOICE OF 10 MOUNTINGS

Concrete Arch Span Replaces Old Truss

**New Structure, Erected at
Maine-New Hampshire Line,
Faced With Masonry; Work
Slowed by Labor Shortage**

BY mutual agreement between the States of Maine and New Hampshire, a new, stone-faced, reinforced-concrete arch bridge has been constructed under the direction of the New Hampshire State Highway Department on U. S. 202 over the Salmon Falls River, which is the dividing line between the two states near the southern end of the boundary. Lebanon, Maine, is on the east side of the bridge, and East Rochester, N. H., is on the west side. The new structure has a clear span of 78½ feet, a width of 51 feet 8 inches, and is designed for H-20 loading. On top it carries a gravel fill, 5½ feet thick at the center, contained by a spandrel wall along each side between which is a 32-foot surface-treated pavement, and a 5-foot sidewalk on the upstream side. It replaces an old steel Warren pony-truss bridge located about 500 feet upstream which had a 77-foot span, but only a 19½-foot clear roadway and an H-5 loading.

The contract for the construction of this bridge was awarded to the O. W. Miller Co., Inc., of Ludlow, Mass., on its low bid of \$74,069.54, which also included nearly 1,500 feet of approach fills topped by a 32-foot bituminous-treated gravel pavement. Work was started in April, 1945, but because of the severe labor shortage, particularly in stone masons, the bridge proper was not completed until near the end of the year, while the loam, sod, and seed work on the slopes is being done this spring.

Grading Approach Fills

Construction on the contract began with the approach fills, in order to give them time to settle before the pavement was added, and also because the height of the river in early spring made work on the footings unsuitable at that time. On the New Hampshire side the approach is 513 feet long and on the Maine side opposite, the approach is 947 feet. The new location rejoins the existing highway at each side. All material for the fills came from a single borrow pit on the New Hampshire side 2 miles from the center of the project. A Link-Belt Speeder 1½-yard shovel worked the pit, loading a fleet of eight 5-yard trucks rented from Tom Watkins, a hauling contractor from Amesbury, Mass.

The old bridge was used by the trucks

for crossing the river, and the material was end-dumped and spread in 2-foot layers by a Caterpillar RD5 tractor-dozzer which also served to compact it. On top of the fill a 12-inch layer of bank-run gravel was put down as a base course for the 4-inch bituminous-surface-treated gravel pavement with a crown of 4 inches for its 32-foot width.

Footings Cofferdams

The Salmon Falls River averages around 4 feet in depth at this point, and has a fairly rapid flow since an 8-foot dam of the Cocheco Woolen Mills is only 400 feet upstream. In constructing the abutment footings on each side, it was necessary to build a cofferdam of 16-inch-section steel sheeting, from 14 to 20 feet long, driving the piles with

a McKiernan-Terry No. 7 steam hammer swung from the 50-foot boom of a Bucyrus-Erie 32-B crane; a Mundy vertical coal-burning boiler furnished the steam.

Driving was slow through the hardpan, gravel, and boulder material, and after a couple of feet had been penetrated the interior of the cofferdam was excavated by an Owen ¾-yard clam-shell bucket attached to the crane boom. The driving and excavating continued until elevation 64 was reached which was the level of the bottom of the footing. No ledge rock was encountered, but a solid foundation was obtained on the hardpan and boulders. Each footing measures 51 feet 8 inches, the width of the bridge, x 15 x 6½ feet deep, while the cofferdam was driven 3 feet beyond each side of where the footing was to go, in order to provide enough space for constructing the forms. Two Rex centrifugal pumps, a 4 and 6-inch, were used to unwater the cofferdams.

The interlocking steel sheeting was

braced with two sets of horizontal rangers, either 12 x 12's or 12 x 16's, set 5 feet apart vertically, with the lower tier at the bottom of the cofferdam and the other supported on vertical 12 x 12's. They were cross-braced with struts which were removed during the concrete pouring. Footing forms were made with 1-inch boards backed with 2 x 6 studs set 16 inches on centers, and double 2 x 6 wales on 24-inch centers.

Concrete Plant

During the pouring of each footing the batch plant was set up on that bank of the river close to the work. The plant was a Winslow Binabatch, consisting of a three-compartment bin, two holding 15 yards for the gravel and one holding 8 yards for the sand, and a bucket riding on a rail below the bins which received the correct proportions of fine and coarse aggregate, weighed on a Winslow scale before being emptied at the other end of the rail into a Koehring Dandie 10-S 2-bag mixer.

(Continued on next page)

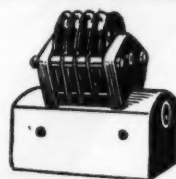
MEMO to All Construction Supts:

*Before we buy Buckets
let's check Haiss
Ratio 7:1*



HIGHEST CLOSING RATIO (up to 7:1)

Can be reeved 3, 4, 5, 6 or 7:1 for speed or power as required. Exclusive 4-Position Wedge-Lock dead ending keeps reeving always parallel and 100% centered in sheave grooves.



LOWER SHEAVES HIGH ABOVE COUNTERWEIGHT

Up, out of the muck. Non-pocketed. No place for dirt to jam, to cause friction or undue rope wear. Bolt holes in block provide for added counterweight.



CAST STEEL BLADE ARMS FOR STIFFNESS

Rib-reinforced. Rigid strength and extra long bearings (renewably bushed) keep bowl closing true. Full efficiency; bigger payloads.



HEAVIEST JAWS OF ANY BUCKET OF ITS KIND

Abrasion resistant alloy. Will stand heavy battering and still hold shape. Chisel-point or pick-point teeth of similar extra strength.

Among Buckets, Haiss Hi-Power excels through a time-tested combination of many superior features.

Weight distribution, for instance, is so concentrated that the bucket jaws carry downward to bury the entire bowl to insure the biggest possible payload.

Similarly, when the Haiss Hi-Power tackles a stuck-fast boulder it "grabs tight" to shake and tug until it's loose and "hoist away".

Investigate now the greater efficiency that comes naturally with buckets engineered by Haiss. Catalogs on request.

GEORGE HAISS MFG. CO., INC., Canal Place & E. 142nd Street, New York 51, N.Y.

Distributors in all large cities

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**THE STRONGEST
GEARED
POWER
FOR ITS
WEIGHT
IN THE
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Dealers in all Trade Centers



New Hampshire State Highway Department Photo
The recently completed bridge across the Salmon Falls River between East Rochester, N. H., and Lebanon, Maine, is a 78½-foot concrete arch span for an H-20 loading.

Concrete Arch Span Replaces Old Truss

(Continued from preceding page)

The crane used in the excavating kept the bins filled from the adjoining stockpiles.

Sand and gravel were purchased from the Manchester Sand & Gravel Co. which delivered it by truck from the plant at Manchester, N. H., 45 miles away. Dragon bag cement was shipped in freight cars from Thomaston, Maine, via the B. & M. railroad to a siding not far from the bridge, and trucked the remainder of the distance. The 4-inch pump supplied the mixer with water from the river and the batches were mixed one minute, then dumped into concrete buggies, wheeled to the forms, and chuted into place. The longest continuous pour was that of 120 yards for the footing which took 14 hours; the usual working day was 9 hours.

The coarse aggregate, a washed gravel, ranged in gradation from 1½ down to ¼-inch. The weights of a typical dry and wet batch are as follows:

	Weight in Pounds Dry Batch	Wet Batch	Per Cent Moisture
Cement	188	188	
Sand	370	384	4
Gravel	630	636	1
Water	92 (11 gals.)	72 (8.6 gals.)	
	1,280	1,280	

Building the Arch

With the footings completed, the contractor then built falsework across the river to support the forms for the concrete arch. Timber piles for the falsework were driven by the same rig that drove the sheet piling, with the exception of a different type of pile head. Eight bents, with nine 12-inch piles to the bent, were driven with from 3 to 6 feet of penetration into the river bed, and were then capped with 12 x 12's. The bents were then connected by ten 10-inch I-beams as stringers set on 6-foot centers. This work was done by the crane as it progressed across the river, building the falsework bent by bent; cross bracing consisted of assorted 2 x 6's and 2 x 8's.

On top of each I-beam stringer went a rib, cut from a 3 x 10 to the radius of that particular arch section; the cutting was done in a local sawmill. On top of the ribs the 2 x 6 floor joists were

laid across the width of the bridge to support the 1-inch floor boards for the arch bottom. Truscon steel reinforcing rods, purchased at Boston and delivered to the job via the B. & M. rail-

road, were then set in place for the pour.

The arch is 1 foot 3 inches in depth at the center and 2 feet at the spring line, and a pouring diagram was set up to pour first the two end sections, each 9½ feet long; then a center section, 36 feet long; followed by the two intermediate sections each 12½ feet long. It was decided to pour the entire arch from the New Hampshire side, so the batch plant was set up on that approach fill and a wooden runway built on top of the arch forms for the concrete buggies to move over.

The 4½-foot-wide runway was built with bents 6 to 8 feet apart made up of 2 x 6's as posts, well cross-braced, and capped with other 2 x 6's, across which were laid two 2 x 8 stringers. These supported 4 x 4 joists every 4 feet on which the 2 x 6 or 2 x 8 planking was laid. During the pouring operations, parts of the runway had to be dismantled, for the posts were in the way of the concrete as the work progressed in the direction of the mixer. Later, when

that section of concrete in the arch had hardened, the runway was built out again, this time resting on the new concrete. Four buggies were used to carry the Class A 3,000-pound concrete to the forms.

Wing Walls

Four wing walls, 22 feet long, slope down from a point level with the top of the arch to the river bank. These walls are 2 feet thick, composed of a stone-masonry facing on the outside, 5 to 9 inches in width, and the rest of the wall of concrete construction. The masonry part of the wall was built first, so wooden forms for the concrete were needed only on one side. This form work was made up of boards, 1 x 6 or 1 x 8, backed by 2 x 6 studs, 16 inches on centers, and braced with double 2 x 6 wales on 3-foot centers. No vibrating of the concrete during the wall pours was permitted as a precaution against loosening the masonry wall.

Of similar construction is the span—
(Concluded on next page, Col. 2)

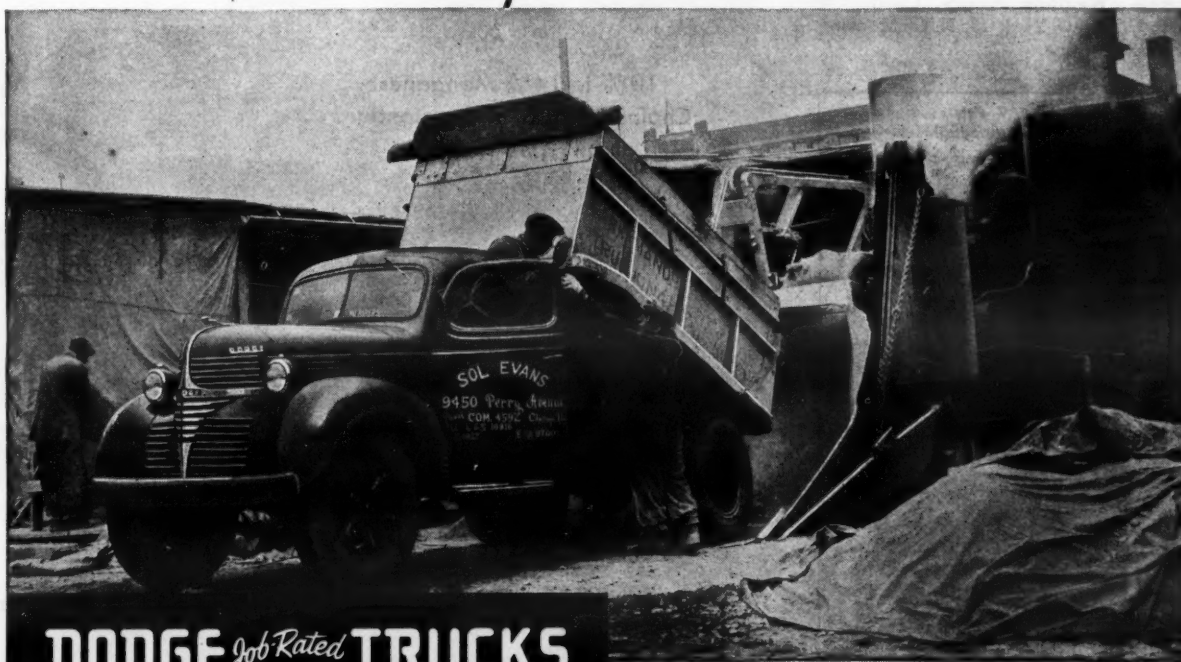
CONTRACTORS SAY:

"There is no substitute
for Job-Rated economy"

You—like thousands of other contractors—*know* that when trucks *fit your job*, they perform more efficiently, operate more economically, and last longer. . . . You know that you get better and more economical performance when the engine in your truck is "sized" for your loads. And you know that when the transmission, clutch, axles, and other units are of exactly the right size for the truck's job—you get *better*

hauling at *lower cost*. . . Dodge Job-Rated trucks fit your needs in many ways. They're engineered specifically for rugged, day-in-and-day-out service. Bodies are big and strong, and drivers like their comfort. . . . If you struggled through the war *without* the economy and dependability of trucks that fit your job—talk to Dodge owners, then to a Dodge dealer. NOW is a good time to switch to Dodge Job-Rated trucks.

DODGE / DIVISION OF CHRYSLER CORPORATION



DODGE Job-Rated TRUCKS

FIT THE JOB . . . LAST LONGER

LISTEN TO THE MUSIC OF ANDRE KOSTELANETZ, WITH FAMOUS GUEST STARS, THURSDAYS, C.B.S., 9 P.M., E.T.

COMPLETE WELL POINT SYSTEMS

WILL DRY UP ANY
EXCAVATION

Faster—More Economically

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36-40 11th St., Long Island City, N.Y.
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The Gunga Din drinking-water dispenser provides clean water, in sanitary cups, and has a salt-tablet container and a receptacle for used cups.

Water Dispenser's Built-In Facilities

To provide workers on construction jobs with pure drinking water in clean cups, the Lily-Tulip Cup Corp. has developed the Gunga Din portable water carrier. Made of Armco Zincgrip steel, this unit has a 5-gallon capacity, a self-contained dispenser for individual drinking cups and saline tablets, and a receptacle for used cups.

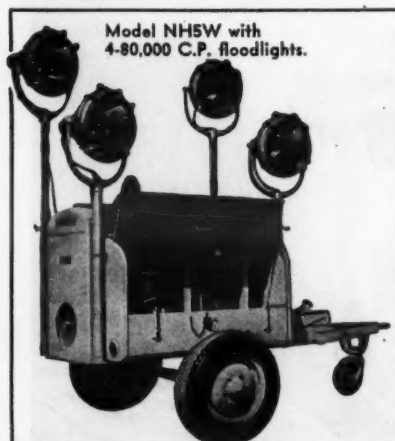
The Gunga Din is built to wear over the shoulders. Sculptured to fit the contour of the back, it has an outer shell to protect the water boy from the chill of the cold metal and to keep body heat from the water. The water is protected from dust by a screw-on cap, which is chained to the tank. Individual paper cups, whose rims cannot be contacted by the hands, are dispensed from a streamlined container.

Write the Lily-Tulip Cup Corp., 122 E. 42nd St., New York 17, N. Y., for full details. Just mention this news item.

New Alloy Deposits Hard Metal Overlay

Developed to resist the abrasive wear to equipment handling sand, cement, gravel, and like materials, a new overlay alloy has been announced by Eutectic Welding Alloys Corp. The alloy is supplied in low-temperature welding rods for oxy-acetylene or electric welding. Applied to cast iron, malleable iron, and carbon and alloy steels, the alloy is said to yield dense deposits that have good resistance to constant abrasion, impact, and corrosion.

Further details concerning Eute-Chrom 13, for oxy-acetylene welding, and EuteChrom 130 for ac-dc arc welding, can be obtained by addressing the Eutectic Welding Alloys Corp., 40 Worth St., New York 13, N.Y. Mention this news notice.



Model NH5W with 4-80,000 C.P. floodlights.

The NITE-HAWK gives you:
LIGHT—Where you want it—when you want it.
POWER—To operate hand tools—saws, drills, hammers, etc.
Floodlight and Searchlight Units up to 14 million candlepower.

Write for Bulletin A.E.D.
LISTER-BLACKSTONE, Inc.
1706 So. 68th Street MILWAUKEE, WIS.

Concrete Arch Span Replaces Old Truss

(Continued from preceding page)

drel wall running the length of the bridge along the outer edge of the arch. This wall is level and is 4 feet high at the center of the arch and 2 feet thick, consisting of about 8 inches of stone and the rest concrete. It contains the gravel fill and lends height to the appearance of the arch which has a rise of 16 feet 1 inch.

The stone masonry used to face the spandrel and wing walls was purchased from whatever granite quarries in the vicinity happened to be in operation at the time. Most of the stone was purchased from the Swenson quarries in Concord, N. H., or Acton, Mass., which delivered their product to the bridge site by truck. Here the masons, using hand tools, cut the pieces to the desired size for the random masonry and the cap stones, and built the walls with 1/2-inch mortar-pointed joints.

Protection was given to the slopes of the approach fills by placing riprap back from the river for 125 to 150 feet, and extending from the toe of slope up to elevation 80, which is at a level with the original ground that distance back from the water. This is 2 feet above the highest recorded flood of 1936 when the water reached an elevation of 78. Some excellent riprap was obtained from the abutments of an abandoned B. & M. railroad bridge at Gonic, N.H., only 6 miles to the south. The large stones, 3 to 4 feet long x 1 1/2 to 2 feet thick, were picked up by the crane which was moved to the site, and loaded into two 5-yard trucks which hauled the material to the river bank where it was dumped and placed roughly by hand.

Items and Personnel

A force varying from 8 to 18 men was employed at different times on this bridge contract. Twice that number could have been used had they been available. The major items included:

Excavation	4,793 cu. yds.
Earth borrow	23,700 cu. yds.
Gravel borrow	7,984 cu. yds.
Concrete	972 cu. yds.
Reinforcing steel	75,280 lbs.
Stone masonry	96 cu. yds.
Riprap	472 cu. yds.

Clayton "Chippy" Chase was Superintendent for the O. W. Miller Co., and K. E. Gillis was Resident Engineer for the New Hampshire State Highway Department which is headed by Frederic E. Everett, Commissioner. D. H. Dickinson is Chief Engineer for the Department, H. E. Langley is Bridge Engineer, and J. O. Morton is Construction Engineer.

LeTourneau Executive

Oscar W. Nelson has been named Vice President and General Manager of its Peoria plant, announces R. G. LeTourneau, Inc., Peoria, Ill. His duties will include those relinquished by Denn M. Burgess, who retired recently as Executive Vice President and Director. Mr. Nelson comes to LeTourneau from the Curtiss Wright Corp.

HENDRIX

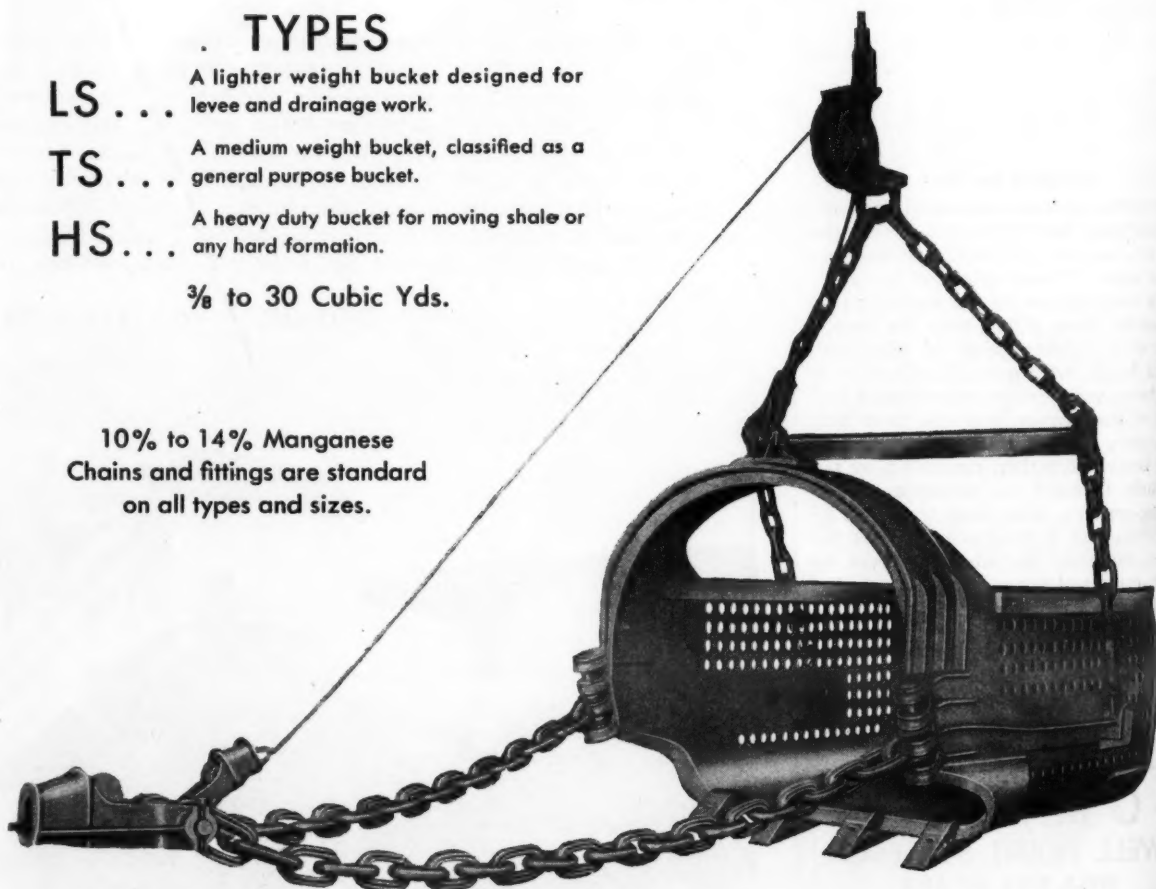
Lightweight DRAGLINE BUCKETS

TYPES

- LS . . . A lighter weight bucket designed for levee and drainage work.
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State Garage Serves 24-Hour 7-Day Week

**Repairs Equipment Used
In Seventeen Counties;
Has Tools for Handling
Jobs of Major Size**

• DISTRICT 7 of the Kentucky Department of Highways comprises seventeen counties in the southern part of the state, with headquarters at Somerset in Pulaski County. One mile south of town on the west side of U. S. 27, the district maintenance garage is located, with someone on call 24 hours a day, 7 days a week, to service equipment used by the Department of Highways. The garage has the tools and facilities for turning out repair jobs of all types and sizes. Although each of the counties has a small state-owned maintenance garage, directed by a supervisor, in which minor repairs are done, all large repair jobs are sent to the main garage at Somerset.

This garage, which is never closed, was built seven years ago on a 2-acre site now enclosed by an 8-foot wire-mesh fence. The front, or east end, of the 60 x 250-foot building faces the highway while the shop yard, on which twelve garage doors open, is on the south side. The garage has a structural-steel frame with corrugated-metal walls and roof, the latter being fitted with several ventilators to keep the interior cool on hot days. A concrete floor rounds out the fireproof construction of the building.

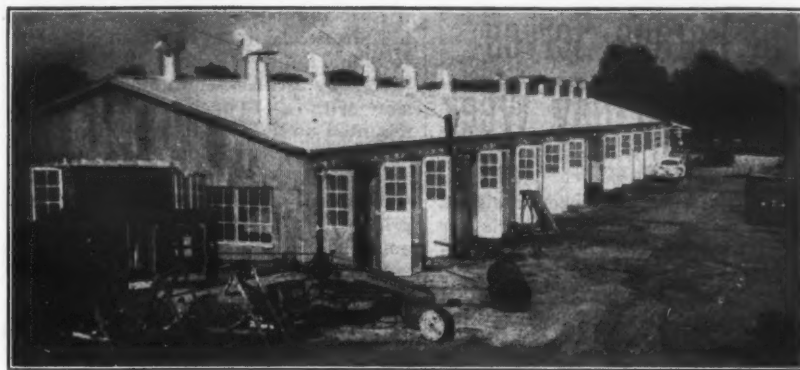
Adequate natural lighting is provided by large windows directly above the mechanics' work benches which are built along the north wall of the garage, and further illumination is obtained through the 12 x 12-foot folding doors at the opposite side of the building. Even when these are closed in cold weather, light comes through the panes of glass in the upper half of the doors. From each overhead truss two electric lights are hung.

At the rear of the building in the northwest corner is the boiler room, where a low-pressure boiler provides heat for the garage. From the boiler hot water is pumped at 20-pound pressure by a Sterling pump through eight McQuay blowers placed along the

overhead trusses. These blowers circulate the heat in winter, and also help in keeping the building cool in summer, when the temperature is usually 20 degrees cooler than the air outside.

Stock Room

Across the 60-foot front and extending 50 feet to the rear of the building is the stock room, two stories high, where replacement parts, tools, and supplies are stored. On the lower floor are eight sections containing wooden bins, 1 x 1 x 1-foot, each section being 6 feet, or 6 bins, high and 16 bins long, for the smaller pieces. The larger items, such as picks, shovels, mattocks, etc., are kept on shelves. As the maintenance forces in each of the counties of the district draw their requirements



C. & E. M. Photo

The District 7 garage of the Kentucky Department of Highways is equipped to handle major repair jobs on the highway units of the district. This view shows the rear of the 60 x 250-foot building and the shop yard.

from this garage, a large variety of stock must always be on hand.

A Kardex system is used to keep an account of every item in the stock room, the records being kept in eight books listed in alphabetical order, and one other book for miscellaneous pieces.

These cards show the number of each item on hand, and the section and bin where they are stored. Stock that is in constant demand, such as truck parts, is kept in a section allocated to the particular make of truck. One section

(Continued on next page)

K... is for the knockout power in Sullivan Paving Breakers

K 81... heavy weight

• Here's the paving breaker that will handle your toughest concrete demolition jobs — economically and efficiently. It breaks more concrete because it strikes more and heavier blows and because the operators find it easier to handle. Outstanding features of the K-81 include the exclusive Sullivan "Dual Valve," flat-sided cylinder for easy holding against operator's leg, replaceable chuck bushings, "U" type side rods and rugged cam-type retainer.

K 61... medium weight

• This is the "younger brother" of the K-81 and is specially suited for thin section concrete and other light demolition jobs. It has the same hard-hitting, easy-handling characteristics but it is lighter in weight. Many of the parts, such as the interchangeable chuck housing, renewable chuck bushing and throttle, will fit both the K-61 and K-81 — which means a considerable saving in repair parts stock.

K 9... light weight

• The K-9 is relatively small but is still a powerful breaker that is easy to handle. Its light weight makes it particularly useful in tunnel, trench or overhead work. Its low air consumption is a big advantage where air supply is limited.

Get the facts about these three paving breakers today. See your nearest Sullivan office or write for bulletins. Sullivan Machinery Company, Michigan City, Indiana. In Canada: Canadian Sullivan Machinery Co., Ltd., Dundas, Ontario.

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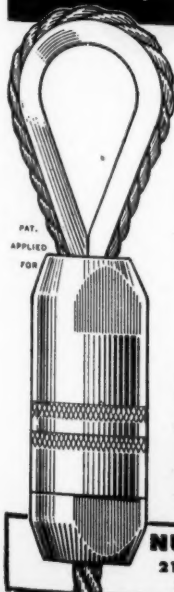
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State Garage Serves 24-Hour 7-Day Week

(Continued from preceding page)

each, for instance, has been assigned respectively to replacement parts for Ford, Chevrolet, GMC, and International trucks. In addition to stock for land vehicles, the garage also must carry a supply of parts for the three ferry barges and the three motor boats which the Department of Highways operates for stream and river crossings in this district. A stock inventory is taken once a month, and a general inventory once a year of everything contained in the garage. Like most highway garages throughout the country, a shortage of replacement parts and tires was the big problem throughout the year 1945.

On the second floor of the stock room old highway plans from the district office are kept on file. This room has its own individual McQuay air-conditioning unit for both summer and winter use. At the rear of the stock room is a sliding window in the dividing wall through which requisitioned parts and supplies are dispensed.

Main Work Room

To the rear of the stock room is the main part of the garage where the repair work is done. Along the north wall is a 30-inch-wide wooden work bench with cabinets beneath in which are kept the parts belonging to the piece of equipment that is being repaired, or mechanics' tools are stored. The bench is provided with electric sockets for lead lights, and for air outlets connected to the Champion air compressor located in the northeast corner of this main wing on a mezzanine platform. Strung out along the work bench is a variety of equipment including 8-inch and 6-inch bench vises; an AC spark-plug cleaner; a Milford riveting machine and a Raybestos burnishing machine for use in lining brakes; a Raybestos brake-lining machine used for brake lining and clutch facings; and a Clark power hand drill with adapters for four different sizes, $\frac{1}{4}$, $\frac{1}{2}$, $\frac{3}{4}$, and 1-inch.

At the center of the garage a 3-foot-high pipe railing encloses a 45 x 20-foot section known as the machine shop. Here is located the large equipment

used in the major repair work, including an Excelsior 21-inch drill press; a LeBlond Regal 19-inch x 10-foot lathe driven by a G-E 2-hp motor; a cut-off saw with a 14-inch circular blade mounted on a 3 x 4-foot wooden table and operated by a $\frac{1}{2}$ -hp electric motor; an Atkins 18-inch power hack saw; a Van Dorn valve refacer; a Sunnen grinder; and a Standard bench grinder, emery stone, and buffer.

Engines are rebuilt in various parts of the large garage on wooden benches 6 x 3 feet in area and 20 inches high, and are easily raised and lowered as required by two Wrico hoists, a 4-ton and a 2-ton, running the length of the garage on two overhead beams secured to the trusses. Light equipment is raised from the floor with a Hein-Werner 2-ton jack. Equipment is greased with Alemite high-pressure power guns after it is raised on a U. S. Air Compressor Co. 2-ton hydraulic hoist.

Towards the rear of the garage is a Caterpillar 90-ton wheel puller for removing sprockets and gears from trac-

tors; and a Wellman-Seaver-Morgan 150-ton hydraulic press operated by a G-E 5-hp motor and used for pressing gears on and off and for straightening shafts. Batteries are charged in the northwest corner of the room on a G-E Tungar battery charger. Other equipment includes a Cincinnati bench grinder; an Airco oxy-acetylene unit for welding and cutting; and a Lincoln 400-amp portable electric welder driven by a 6-cylinder Hercules gas engine, the entire outfit mounted on a skid rig which is hoisted on a truck when it is necessary to send it out in the field on a repair job.

Other Operations

Washing and painting of cars and equipment are done at the rear bay in an enclosure made by hanging curtains from the trusses. This section is equipped with a trap in the floor for carrying off the water used in washing. DeVilbiss spray guns are used in the painting. Tires are repaired at this end of the building, and tubes are tested for

leaks in a water tank 5 x 4 feet x 6 inches deep.

In addition to the boiler room at the rear of the garage, there is also a locker room; an extra storeroom for parts; a coal storage room with extra fuel for the boiler kept outside in the yard; and a blacksmith shop which contains a 4-foot-square forge with a Champion blower, a 200-pound anvil, and a work bench with vise. The entire building is equipped with Pyrene Foam fire extinguishers.

Equipment that cannot come to the garage under its own power for repairs is transported on a Cummins-diesel-powered 8-ton truck which returns it, on the completion of the work, to the county from which it came. Besides bringing equipment to the garage for repairs, work in the field is done by sending out each day four pick-up trucks with one or two mechanics, depending on the nature of the breakdown that has been reported. This procedure is followed for all emergency

(Concluded on next page)

SCHRAMM'S COME ALL SIZES!

Yes, Schramm Air Compressors are available in a variety of sizes—all designed to meet the needs of construction and contracting engineers.

The overall picture is this. You get all the air you want with Schramm Air Compressors.

Specific features of Schramm Compressors are (1) 100% watercooled (2) forced feed lubrication (3) mechanical intake valve (4) compact, lightweight!

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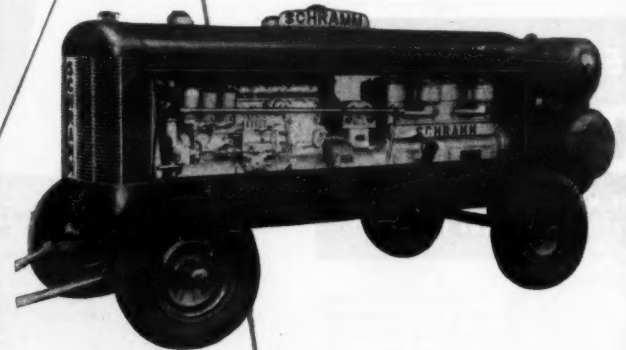
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KELLY HOSE COUPLINGS

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MALLEABLE IRON—RUST PROOFED



UNIVERSAL TYPE—Locking heads of all styles and sizes interchangeable from $\frac{1}{4}$ " to 1".

QUICK-ACTION—Instantly connected or disconnected with one quarter turn.

TIME TESTED—DEPENDABLE. Manufacturer of these couplings since 1921.

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HOSE COUPLING DIVISION
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State Garage Serves 24-Hour 7-Day Week

(Continued from preceding page)

repairs which can be done on the road with ordinary hand tools.

Personnel

The District 7 garage has a staff of seventeen to maintain the equipment which includes 196 trucks, 9 trailers, 9 passenger cars, 5 patrol cars, 4 snow plows, 65 tractors, 12 pull-type graders, 13 power graders, 7 shovels and cranes, 6 scarifiers, 7 power rollers, 3 aggregate spreaders, 3 power sweepers, 12 power mowers, 2 mechanical sweepers, 35 air hammers, 4 wagon drills, 21 air compressors, 3 ferry barges, 3 motor boats,

11 stone crushers, 10 power units, 2 transport trailers, 5 transport tanks (500 to 1,500-gallon), 18 bituminous heaters, 3 bucket elevators, 12 concrete mixers, 2 retreading and mixing units, 4 water pumps, a sand-blast machine, 7 tanks for storage plants (8,000 to 10,000-gallon), a power saw, and a set of scales.

Operations at the garage are under the direction of L. I. Marcum, Superintendent. The Kentucky State Department of Highways is headed by J. Stephen Watkins, Commissioner, with Thomas H. Cutler as State Highway Engineer. The Division of Maintenance has H. D. Metcalf as Director and H. H. Palmer, Assistant Director. W. F. Johnson is District Engineer for District No. 7, with headquarters at Somerset.

"Play Day for Papa"— C&E Readers Get Break

"It's papa who pays," the old saw says. But to any child who has ever received a new toy train, it is papa who "plays". Readers of CONTRACTORS AND ENGINEERS MONTHLY who double in brass as fathers will be interested in a recent announcement by The Charles Wm. Doepke Mfg. Co. of its new line of construction-equipment toys.

Bearing the nameplates of Woolbridge, Jaeger, Barber-Greene, and other leading construction-equipment manufacturers, Doepke's products are similar to those "Pop" uses every day, and include working scale-model all-metal dirt-movers, loaders, trucks, and concrete mixers. Tires by Goodyear

add a further note of realism. Junior can actually load and haul sand or mix concrete—if he gets a chance. "Father! Get out of that sand pile! You've just wrecked Shasta Dam!"

Further details on these Doepke toys may be secured direct from the company at Verne Ave. and B. & O. R.R., Cincinnati 9, Ohio. Just mention CONTRACTORS AND ENGINEERS MONTHLY.

Homestead Names Thomas

Sales in the southeastern states will henceforth be supervised by William E. Thomas, the Homestead Valve Mfg. Co. of Coraopolis, Pa., has announced. Formerly with the Chicago Metal Hose Co., the new Division Sales Manager will have headquarters in Atlanta, Ga.



ONLY GALION GRADERS

GIVE YOU ALL THESE FEATURES

1. Full hydraulic control.
2. Extra rugged single member frame.
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9. Ball and socket drawbar connection to head block.
10. Rigid drawbar and circle assembly.
11. No side sway or springing of moldboard under full load.
12. Wide clearance between front wheel and blade.

Plus many other time- and money-saving features.

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IRON WORKS

Weight alone is not sufficient in a motor grader. It must be properly distributed if the highest working efficiency is to be obtained.

The GALION design places approximately 70% of the weight on the drive wheels so as to use all engine power for tractive effort. Front wheels take approximately 30% of the weight. This efficient distribution of weight permits utilization of maximum pressure (approximately 50% of total weight) on the blade without stalling.

You will find correctness of basic design strictly adhered to throughout every feature of GALION Motor Graders. It's one of the prime reasons for the outstanding performance record a GALION Grader makes on any job—whether it's bank cutting, road widening, scarifying, ground leveling, or street construction.

THE GALION IRON WORKS & MFG. CO.
GALION, OHIO

Catalog No. 290 gives complete information on the NEW Galion Model 102 Motor Grader—write for your copy today, and names of nearest Distributors.

GRADERS • ROLLERS

Concrete Apron

(Continued from page 1)

Carolines during the war. Rather, it was the terrific wheel loads imposed by the advent of heavy planes of the B-29 and C-54 transport class. These huge airplanes had already caused most of the west half of the parking apron to fail so badly that further use of this portion was dangerous and inadvisable.

The new pavement rests on approximately the same subgrade as the old soil-cement, except for certain areas of blue gumbo soil which were removed under the Koss contract and replaced with the reddish sand and silt native to the high Roswell plateau.

Removal of Soil-Cement

A Caterpillar D7 tractor with a LeTourneau heavy-duty three-tooth Rooter started the job rolling on November 20, 1945. Two of the teeth were removed from the Rooter, because everyone knew, or thought he knew, the soil-cement would be tough to break. No one was exactly disappointed.

At that time of year it was cold at Roswell; so cold that the asphalt mat was hard and brittle instead of elastic. It was so hard it tended to pull the ripper tooth out; consequently the D7, operating in first gear, ripped up the old asphalt before further attempts were made to break the soil-cement. The asphalt pavement was then pushed off to one side by a bulldozer on a Caterpillar D7.

When the soil-cement was exposed, it was torn out about as easily as the 2-inch layer of asphalt had been. Under the action of this single-tooth Rooter the material cracked up in chunks seldom larger than 14 inches square. The gradation was fairly uniform from this size down to small pieces 1½ to 2 inches in size. There was still sufficient adherence in the old material to prevent its breaking into pieces much finer than that. Broken asphalt and soil-cement was loaded into 5-yard dump trucks by an American crane with a 1-yard clam-shell bucket, and by a Jaeger loader. This old material was hauled away and wasted.

Preparation for Concrete

A few pockets of blue clay were dug out and replaced by silty sand. Then the top 4 inches of subgrade was moved to one side by one of three Caterpillar No. 12 motor graders on this job, and the 2 remaining inches within the foundation zone were processed. Specifications called for maximum density of 95 per cent plus in this 6-inch layer under the concrete, and the soil was tricky enough to require especially careful treatment.

Water was hauled in by 1,000-gallon trucks and sprinkled on the dirt. After being scarified and mixed, tandem sheepsfoot rollers weighing 19,500 pounds were turned loose. Fewer rollings by these heavy rollers worked better than many rollings by lighter rollers in this material; however, it was necessary to build the 6 inches in two or even three lifts in order to achieve the required density. On the top layer, even after the heavy sheepsfoot rollers had worked themselves up to the surface of the ground, it was necessary to use additional smooth rollers later on, after a subgrader had come in and done its work.

But the moving and processing of dirt on airports is a familiar story to the Koss Construction Co. This firm built no less than fifteen airports in widely scattered sections of the United States during the war, meeting or beating schedules on each of them. Although Koss had until May 2, 1946, to finish the Roswell job, its completion date was scheduled more than a month ahead of that time. This speed-up was brought

about by the efficient use of all equipment, the handling of materials only once in general, and by a sequence of work which was designed to place concrete against only one form whenever possible.

Removal of old pavement and grading were conducted in such a manner that the first pour finished one of the 13½-inch strips near the center of the apron. This, of course, had to be poured against a set of forms on each side. After that, the equipment could work with one wheel on finished concrete and one on the single set of forms. This procedure made it possible for the six men of the form-setting and aligning crew to work steadily. Approximately 6,000 linear feet of Blaw-Knox steel forms were available on the Roswell job. They were set in a trench cut by a Carr Formgrader, lined up, and staked down securely in place.

A Buckeye RB Finegrader then moved in with its wheels on the forms or finished concrete, and completed a 25-foot strip to exact grade. The sub-

grade was not left high. Excess dirt from this machine fell in a shallow windrow on the adjoining strip, and was removed by the Jaeger rubber-tire-mounted loader. This machine, with its cable-controlled bucket operating off the end of a short boom, could scoop up loose dirt on concrete pavement if necessary, and it loaded out an average of 35 to 45 cubic yards per hour. Since the amount of excess fill in the subgrade was not great, this machine could handle by itself the clean-up work ahead of a pour.

After the Buckeye Finegrader had finished, the subgrade was given one last check for elevation and the forms were checked again for alignment. A steel-wheel roller was also used to smooth and compact the grade at this time. Forms were given a coating of paraffin oil by means of wheelbarrow-mounted sprays, and were ready for the pour.

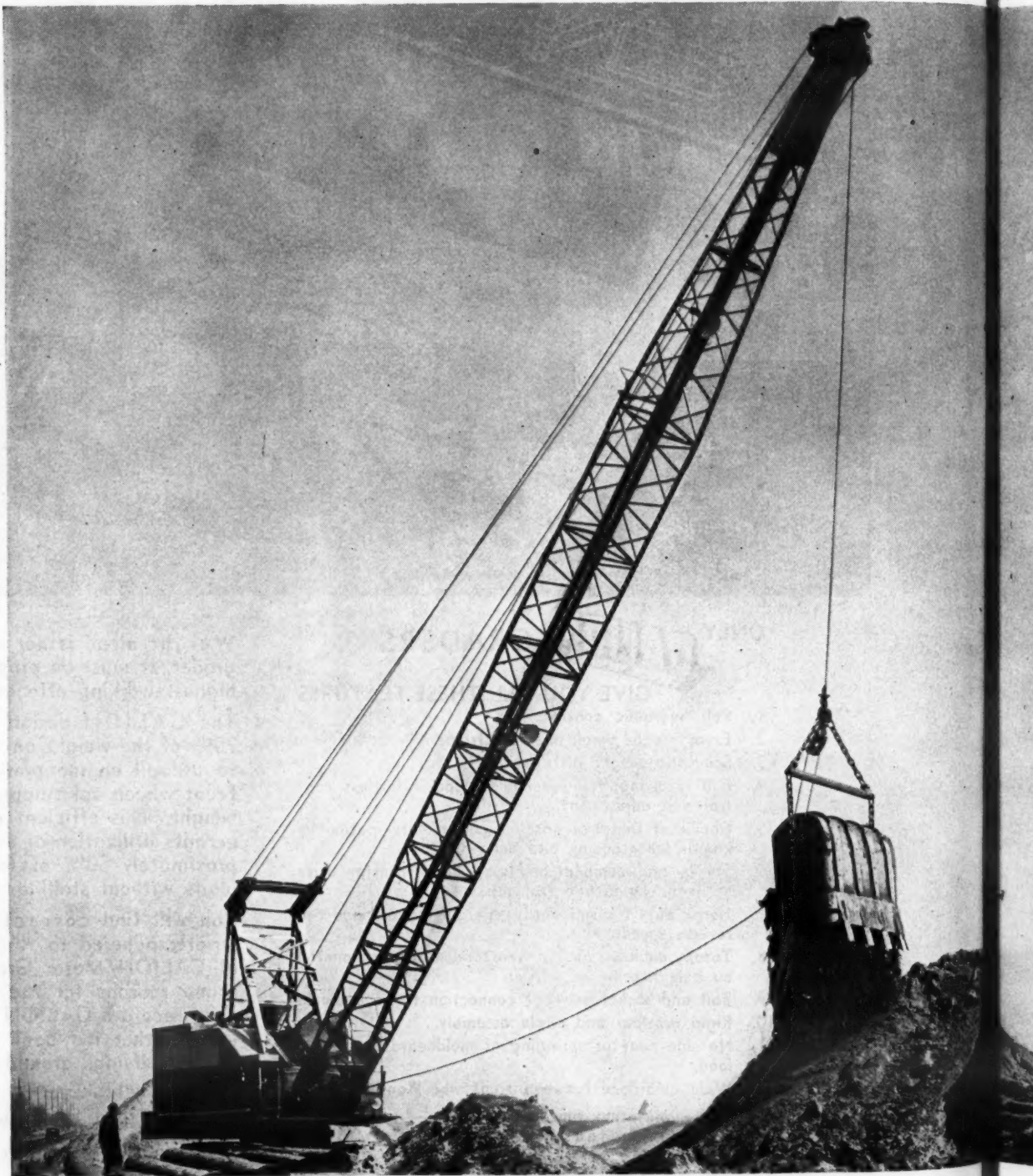
Concrete Placing

A Koehring 34-E dual-drum paver,



equipped with a 35-foot boom and a Koehring Twin-Door bucket, was used to mix and place the concrete. This machine was spotted on a lane adjacent to the one being poured, and moved forward parallel with the strip under construction. Two 1,000-gallon water-

(Continued on next page, Col. 4)



TUNE IN THE
TEXACO STAR
THEATRE EVERY
SUNDAY NIGHT
STARRING JAMES
MELTON WITH HIS
GUEST, ED WYNN
—CBS



TEXACO

Crane-Shovel-Hoe Is Added to Thew Line

To enable it to meet any job condition, the Lorain TL-20, a new power shovel and crane announced by the Thew Shovel Co., can be equipped with a choice of five interchangeable booms, and ten different mountings. The new addition to the Thew line is supplied with either crawlers or rubber-tired wheels.

The principle of "unit assembly" features the turntable design of the TL-20. Each major component, the clutch shaft, cab, engine and accessories, and the hoist shaft can be removed and replaced as a unit. Control for the machine is centered in five shoe-type clutches, mounted in one unit. Noiseless roller chains, one-piece all-welded turntable beds, hook rollers, anti-friction bearings, cut gears, and many other operational features mark the unit.

Crawler-mounted, the TL-20 is a chain-driven unit with two speeds in either direction. It has drop-forged



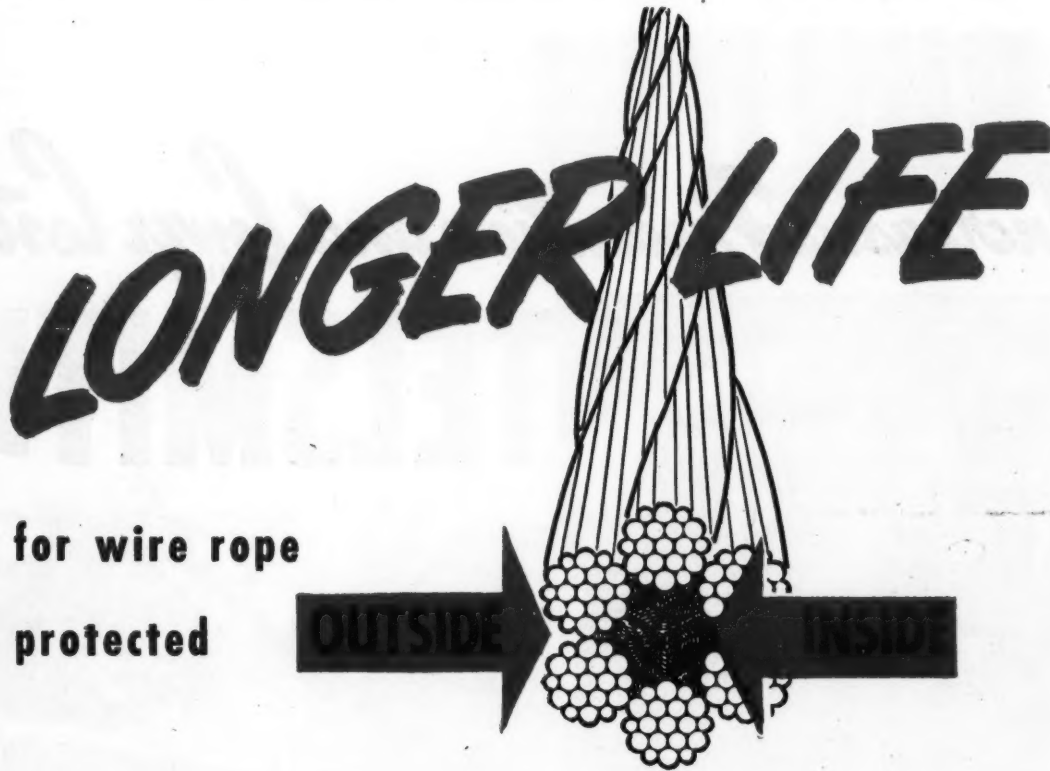
The new Lorain TL-20 shovel-crane unit features interchangeable booms and ten different types of mounting to meet all types of job conditions.

treads, positive tread and travel lock, and either-directional steering ability. Rubber-tired units come in all variations of four and six-wheel styles, in two-engine Moto-Cranes, and single-engine self-propelled models.

Two sets of sheaves, arranged in tandem to offset load fouling, and an all-welded two-piece boom feature the TL-

20 as a crane. When used as a shovel, the machine has a positive, independent crowd of tremendous digging force, the manufacturer says. A goose-necked boom is provided for the unit when it is used as a hoe.

Full details and specifications on the TL-20 can be secured from the Thew Shovel Co., Lorain, Ohio.



YOUR wire rope will stay stronger longer — give you many extra months of efficient service — if you protect it with *Texaco Crater*. That's because *Crater* provides thoroughly effective lubrication both *inside and out*. It penetrates to the very core and prevents rotting — greatly reduces friction and wear resulting from rapid flexing.

You can depend on *Texaco Crater* to retain all its protective qualities under the most adverse operating conditions. It resists the corrosive effects of the weather. It has been

the standby of experienced operators the world over for more than 30 years.

Texaco Crater is also an extremely effective lubricant for open gears. It cushions heavy loads and shocks, quiets noise, materially reduces wear.

For Texaco Products and Lubrication Engineering Service, call the nearest of the more than 2300 Texaco Distributing plants in the 48 States, or write:

The Texas Company, 135 East 42nd Street, New York 17, N. Y.

Concrete Apron

(Continued from preceding page)

tank trucks were used to haul mixing water from the Roswell Army water-supply system on the field to this paver. They traveled along with the paver, connected by means of a 40-foot length of 3-inch hose, until they had been emptied by the water pump on the paver. Water from this same source of supply was sprinkled on the subgrade through a garden hose, just ahead of placing.

The mix was proportioned as follows:

Material	Dry Weight
Fine sand.....	1,183 lbs.
Pit-run sand.....	407 lbs.
Fine aggregate (¾-inch).....	1,780 lbs.
Coarse rock (1½ to 2-inch).....	1,185 lbs.
Cement.....	720 lbs.
Water.....	33 gals.

These materials were dry-batched at a plant which will be described later, and hauled to the paver skip by fourteen Ford, Dodge, and Chevrolet 1½-ton trucks, carrying two 37.4-cubic-foot batches. Moisture tests had been run on this sand and aggregate before it reached the paver, and the batches had been compensated for the weight of moisture. The remaining water was added to the mix at the paver, and the concrete was mixed 60 seconds.

Concrete was dumped against the far side from the operator, working in towards the paver in a four-batch ribbon. When this ribbon was placed, the paver moved ahead about 7½ feet.

A Jaeger spreader and tamper then moved up over the batch, tamping and spreading it to a flat grade across the top of the forms. This machine also carried two Jackson electric vibrators mounted on the rear end of its frame, spaced 6 inches away from the edge of the pour. As it moved forward, these vibrators consolidated the edges. The Jaeger tamping bar and screw-type spreaders distributed and compacted the concrete in the center of the course. This machine stayed within several feet of the dump bucket on the Koehring paver.

A Jaeger-Lakewood double-screed finisher followed the tamper, making at least two and sometimes three passes over the surface, depending on the amount of excess grout, and also on the slump of the concrete. The average slump over the job was 1½ inches in a 12-inch cone.

Following the finishing machine, a Flex-Plane machine was used to place a longitudinal strip of mastic material down the center of the 25-foot strip, and to place dummy contraction joints on 20-foot centers. The longitudinal-joint material was 1¾ inches long x ½ inch wide, and was placed about ½ inch below the surface of the concrete. Transverse dummy contraction joints were made by inserting two strips of steel 1½ inches deep, and tapering from ¾ inch at the top to ¼ inch at the bottom, into the concrete. Two strips were necessary to reach across the 25-foot course. The depression for these strips was also cut by the Flex-Plane machine.

A Koehring Longitudinal Finisher was the next machine in line. Two men with long-handled bullfloats followed this machine and smoothed the surface. Two more finishers, operating a 4-inch x 25-foot leather belt, put the final herringbone-pattern finish on the slab.

Three finishers with ½-inch-radius edgers and brushes finished the longitudinal joint above the center strip which had been laid by the Flex-Plane machine. They also put the finishing touches to the transverse contraction joints, and lifted the metal strips up slightly. After the concrete had taken on its initial set, these strips were lifted out, and a coating of curing solution was applied by wheelbarrow-mounted

(Concluded on next page)

Lubricants and Fuels

FOR ALL CONTRACTORS' EQUIPMENT

Concrete Apron

(Continued from preceding page)

power sprays, at the rate of 1 gallon to 100 square feet.

On dry, clear days when the sun was shining, this curing treatment seemed to be satisfactory, but the moment any concrete was finished in cloudy, damp weather, hair checks were noticeable in the finished pours. The cause of this had not been discovered when the job was visited in the middle of February, but some experiments were being made to determine at what stage the concrete would be most likely to resist this checking. The indications seemed to point to the advisability of applying the curing solution at the time the surface glaze left the pavement.

Redwood expansion joints 1 inch wide were placed in the slabs on 100-foot centers. These boards were secured at the bottom by Star lugs spaced on 12-inch centers, and held at the top center by a metal clamp staked to the subgrade. This clamp was removed, when the joint was finished, and used again. No dowel pins were used except at construction joints, where the plans called for $\frac{3}{4}$ x 16-inch round steel pins on 12-inch centers, painted with red lead and greased with graphite lubricant. These dowels were supported by holes which were drilled through the redwood boards.

A form for a keyway to prevent vertical movement between slabs was bolted on the Blaw-Knox forms. This was a comparatively small key, being only 1 inch deep x 2 inches wide, and was placed approximately in the center of the slab.

In connection with the placing of concrete, the contractor devised a skid for moving his spreader, finishers, and the Flex-Plane machine to the next strip after each reached the end of a pour. The machines rolled on to this skid, which was built of timbers and angle iron and was only 12 inches high, as they finished their particular operation. A Caterpillar No. 12 motor grader pulled this sled loaded with any of the machines. Therefore the only delay at the end of a strip was that necessary for the paver to crawl over to the next location. That delay was never more than 30 minutes, and subsequent pours were under way at Roswell within 10 minutes of the breaking off of work on the finished strip. Wherever the paver stood or traveled on concrete, the specifications stipulated that this concrete

must be at least a week old, and all construction work was scheduled accordingly. Most of the time Koss actually exceeded the specifications by protecting the concrete with a layer of dirt which was removed by a power broom later.

When the concrete strips were 24 hours old, the forms were stripped, cleaned with shovels, and moved ahead by truck to the next location. A catch was made to fasten on the bulldozer blade of a Caterpillar D4 tractor for the pulling of form pins. When extensive stripping was necessary, this little tractor moved in and threw a fair pin-pulling fit.

Concrete Batching

A subcontract was entered into with F. M. Reeves & Co., Roswell, N. Mex., for the furnishing of aggregates and sand. Aggregates and coarse sand were produced about 5 miles north of the air base, and hauled in by truck. Fine sand was produced by the same subcontractor about 20 miles north, and hauled by

railroad cars to a spur siding which terminated at the same batching bins on the job.

When the trucks dumped their loads on the ground at the gravel bin, a Northwest $1\frac{1}{4}$ -yard clamshell was used to pick up the material and store it in a Blaw-Knox double-bin batcher, each bin holding $42\frac{1}{2}$ tons of material. Johnson beam scales were used to weigh the batches. A truck, passing through, loaded 2-inch aggregate and 1-inch aggregate in that order at this bin.

The Johnson double-compartment sand batcher accommodated 30 tons in each compartment. An American crane with a 45-foot boom and 1-yard clamshell bucket was used here to hoist trucked sand to one bin. Railroad cars carrying fine sand were spotted in such a way that the same crane could also handle that material without moving. Batch trucks stopped here to take on coarse and fine sand in that order.

Trinity bulk portland cement from Fort Worth, Texas, was used in the early part of the job, but later a change

was made to Victor bulk portland cement from the Consolidated Cement Corp. plant at Fredonia, Kansas. Cement came by railroad in hopper-bottom cement cars, and was dumped on a feeder hopper which sent the cement, by means of an auger screw, to a Johnson 75-barrel storage bin. It ordinarily required 3 days to ship a car from Fredonia to Roswell, but since that occasionally extended to 5 days, a 24-hour run was kept stocked ahead to allow for any contingency. The cement was weighed on Johnson beam scales with a dial indicator.

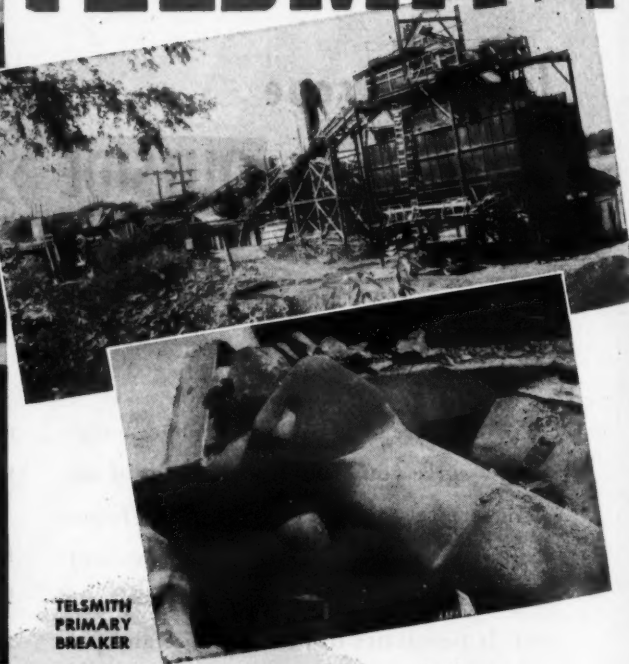
Organization

Lieut. Colonel R. E. Cole is the District Engineer of the Albuquerque District, and was represented on the job by Project Engineer E. T. Garrett. Al M. Beuerlein was Superintendent for the Koss Construction Co. Mr. Beuerlein has directed a considerable part of the extensive airfield paving that company did to solve an emergency during the war years.

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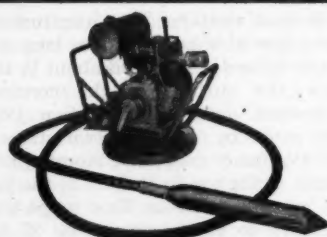
and minus $\frac{1}{4}$ " plus $\frac{1}{8}$ " (N.Y. #1A) sizes—at top tonnage—with very low power and upkeep costs!

An all-around production booster has also been added—a Telsmith 4' x 12' Heavy Duty Apron Feeder built to take the heaviest loads the trucks can dump on it. And its cutting maintenance costs right and left—on conveyors, crushers and screens. The original plant had a 13-B Telsmith Primary Breaker. With its higher speed, faster feeding and bigger capacity, it has been proving itself a low-cost producer for a long time.

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Ohio uses a portable roller, weighing 1,600 pounds empty and 2,000 pounds when filled with water, on the berms along the highways each spring, to restore grade after winter heaving. Power is supplied by a Case tractor, also used for mowing.

Land Acquisition and Road-Access Control Vital to Future Work

Increasing awareness of the importance of land acquisition and control of highway access and adjacent areas is being evinced by state and local highway management, reports a Highway Research Board committee studying such activities. Headed by David R. Levin, Public Roads Administration economist, the body recently made its first report.

By the beginning of the year, 24 states had given legal sanction to the control of highway access. These include California, Colorado, Connecticut, Delaware, Florida, Illinois, Indiana, Louisiana, Maine, Maryland, Massachusetts, Michigan, New Hampshire, New Jersey, New Mexico, New York, Ohio, Oklahoma, Pennsylvania, Rhode Island, Texas, Virginia, Utah, and West Virginia. Several other states permit the acquisition of "access rights".

The recently revised Missouri constitution provides the first sanction by organic law of highway-access control. It gives the Highway Commission the power "... to limit access to, from, and across state highways where public interest and safety may require, subject to such limitations and conditions as may be imposed by law".

Those states which lack a comprehensive law on highway-access control, but which want to give consideration to such an enactment, can find an effective language guide in the PRA's model bill, the Committee reports. This working model also deals with many problems incidental to establishing an express highway.

Efforts to establish a limited system of express highways at the state level have already been crystallized in one state, New York, which has designated by statute a throughway system of controlled-access highways for some 480 miles. California is contemplating a like step, such a bill having been introduced in the 1945 Legislature.

A differentiation is made between "full" and "limited" freeways in Cali-

fornia. That state now has about 25 miles of full freeway, characterized by grade separations and elimination of all private access except through local ways or approved road or street en-

trances. Limited freeways are expressways to which access is confined to a reasonable number of entrances and grade separations. Freeways make up 52 of the state's 124 projected highways, with 99.8 of the proposed 220.9 miles to represent full freeways.

Because of the increasing importance of land acquisition to modern highway development, the California Department of Public Works some time ago created a right-of-way department. This action centralized administrative control of all highway land-acquisition activities under a new official, Chief Right-of-Way Agent. The new organization has attempted to modernize procedures, record-keeping, and related functions, much attention being given to pre-appraisal procedure.

In like fashion, other state highway right-of-way departments are becoming more and more aware of the need for adequate records on land-acquisition transactions. To this end, Oklahoma has filed and indexed the original recorded copy of every easement ob-

tained for highway purposes since 1925.

The Highway Research Board's Committee on Land Acquisition and Control of Highway Access and Adjacent Areas comprises, in addition to Chairman Levin, the following: Frank C. Balfour, California Division of Highways; J. M. Devers, Oregon State Highway Commission; J. L. Dickson, Texas Highway Department; H. E. Hilts, Public Roads Administration; L. W. Kern, Maryland Roads Commission; Theodore M. Matson, Yale University Bureau of Highway Traffic; H. J. Neale, Virginia Department of Highways; and Flavel Shurtleff, American Planning and Civic Association.

Tire Output Threatened

Textile shortages are seriously threatening to halt the upturn in tire production and move further into next year the day when a normal supply of tires is available, according to a recent statement by the Rubber Manufacturers Association.



over ROUGH GROUND

Higher travel speeds can be maintained over rough, rocky or rutty surfaces due to the free floating action of the single King-Pin on Wooldridge Terra-Cobras.

Either unit can tilt while the engine unit freely turns in either direction with no danger of "jackknifing." Positive steering control further permits operator to set and maintain a true course of travel at all times—and at all speeds. Increased yardages per hour, per shift, per day result. To speed up your operations investigate Wooldridge Terra-Cobras, today.

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Tough and rugged design for standard makes of tractors.



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Heavy Resurfacing For 4-Lane Highway

Bituminous Surface Course Laid 4 Inches Thick on Old Concrete and Macadam To Improve Main Route

HEAVILY traveled four-lane U. S. 1, or Baltimore-Washington Boulevard, was resurfaced last summer in Maryland, beginning at the Baltimore city line and continuing south 13.3 miles to the city line of Laurel, a town about halfway between Baltimore and Washington, D. C. The original 40-foot concrete and macadam pavement, rebuilt in 1929-1930, had become rough and cracked over the past fifteen years; this condition necessitated its removal in many locations and the placing of gravel sub-base material to support the new concrete patches.

Four different contracts for this work were awarded by the Maryland State Roads Commission. The contract for the first 3 miles, beginning at the Baltimore city line and extending southward to the Patapsco River, was awarded to the American Paving & Contracting Co. of Baltimore for \$121,260.10. The coarse aggregate in this hot-mix was slag. The next contract, which is described in this article, used stone in the coarse aggregate for its 2.3-mile length, and picked up at the end of the first mentioned contract and continued to Harwood Park. The Eastern Highways Corp. of Baltimore was awarded this job on its low bid of \$101,654.25. The two remaining contracts were each 4 miles, and were built by E. Stuart Mitchell for \$189,771.50, and the American Paving & Contracting Co. for \$158,709.00, using stone and slag respectively for coarse aggregate. The total cost of this work was \$571,394.85. With the use of stone in the coarse aggregate of the hot-mix on two of the contracts, and slag in the other two, Maryland highway engineers hope to establish some kind of comparison between the two types of aggregate.

The Eastern Highways Corp. started work on its 2.3-mile contract by installing new pipe underdrain 3 to 4 feet off both edges of the pavement. Excavation was done by a Barber-Greene

trenching machine after which Robinson 6-inch vitrified-clay Skip-Pipe was laid with open joints. This pipe, semi-circular in section, lies under the 5-foot shoulders of the road, at a depth of 4 feet. The trench was backfilled with washed gravel to the subgrade of the shoulder.

Concrete Patching

With the drainage taken care of, the next step was to remove those areas of concrete that were to be replaced with a patch. This work was done on two lanes at a time, as was the black-top paving, in order to maintain traffic on the other two lanes. Each lane is 10 feet wide. None of the patches was less than 10 feet, or one lane, wide, and their length ranged from 10 to 200 feet.

The 9-inch slabs were broken up by an Ingersoll-Rand Jackhammer powered by a compressor of the same make, which cut the concrete up into 3 or 4-foot squares. The broken chunks were next removed by a General 3/4-yard skimmer excavator which loaded the concrete into two Ford 1 1/2-ton dump trucks. The discarded rubble was disposed of in three ways: some was dumped along an abandoned section of state road and later collected by the maintenance department which could find a use for part of it; property owners along the road made use of a portion of it; and the rest was wasted in a nearby pond at the request of the pond owner.

Below the concrete the subgrade was excavated to a depth of 12 inches and replaced with a special mixture of sand and gravel sub-base material which came from a borrow pit 4 1/2 miles from the center of the project. This granular material was taken from the pit by a General crane, with a 65-foot boom and a Blaw-Knox 1/2-yard clamshell bucket,

which loaded six 5-yard trucks, each averaging about ten trips a day. The clay material which was removed from the subgrade was hauled away by three or four Ford trucks and wasted on fill slopes.

The sand and gravel sub-base material was dumped and spread in 6-inch layers, by hand in the smaller-size holes, and by a Caterpillar No. 12 power grader on those patch holes where it could be used effectively. In the small holes the material was compacted by pneumatic tampers, and in the holes covering a large area the layers were rolled by running a Ford truck loaded with 4 tons back and forth over the freshly dumped material. A final rolling was given by a Littleford 3-ton tandem roller. During the spreading and compacting, the sand-gravel was wet down with water from a 600-gallon tank mounted on a chassis and drawn by truck alongside the hole while the water was sprayed on from a hose. Water was usually taken from hydrants

(Continued on next page)

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TAKING time out to figure operating costs of their new BUDA DIESEL powered shovel, a large midwest operator was more than satisfied to find that the new machine not only out-performed other units, but operated at "one-third the cost of steam."

Service records of BUDA DIESEL powered construction, quarry and mining equipment all over the country are proving every day that these modern "ONE-SIXTY-ONE" SERIES engines are tops for economy and dependability.


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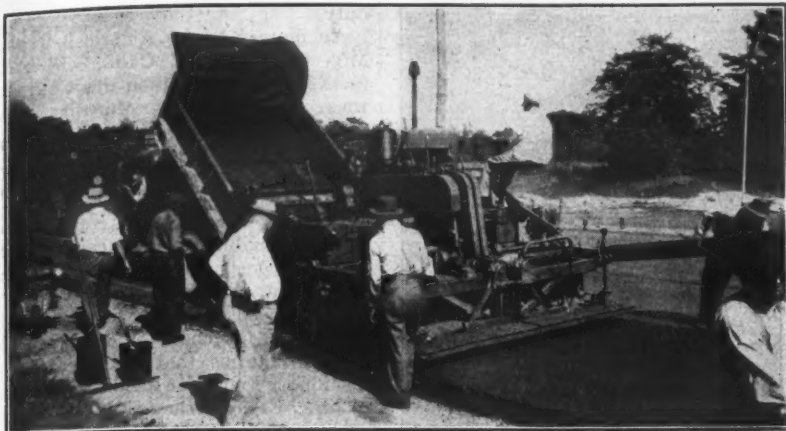
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C. & E. M. Photo
Eastern Highways Corp. used a Barber-Greene finisher to lay the two-course hot-mix paving on its 2.3-mile contract on U. S. 1 in Maryland.

Heavy Resurfacing For 4-Lane Highway

(Continued from preceding page)

since the highway ran through municipalities, but the tank truck was also equipped with a 2-inch pump for pumping water from creeks or ponds when necessary.

Steel forms were then set in place to receive the ready-mix concrete which was purchased from the Arundel-Brooks Corp. in Baltimore, and transported 12 miles to the job in four Smith truck-mixers of 4-yard capacity. The haul took about half an hour. High-early-strength cement was used to speed up the work. A bituminous agent was employed for curing, being sprayed on from a portable tank. After three or four days, when the concrete had attained a tensile strength of 500 pounds, traffic was permitted over it. On the large patches a Koehring finishing machine was used, but the smaller patches were finished by hand. Twelve men were employed in the concrete gang.

The gradation in a typical batch of the sand and stone used in the concrete was as follows:

Sieve Size	Per Cent Passing Sand	Per Cent Passing Gravel
2-inch	....	100
1½-inch	....	82
1-inch	....	52.0
¾-inch	....	19.2
¾-inch	100	....
No. 4	97.0	1.6
No. 8	85.0	....
No. 16	71.0	....
No. 30	49.2	....
No. 50	15.6	....
No. 100	4.5	....

The dry weight of a 7.5-bag batch was as follows:

Cement	705 lbs.
Sand	1,084 lbs.
Gravel	1,948 lbs.
Total	3,737 lbs.

To such a batch was added 37.5 gallons of water.

Hot-Mix Surface

When the patching was completed, the road surface was prepared by sweeping it thoroughly with a Littleford rotary broom to remove all dirt before bitumen was applied as a tack coat for the bituminous-concrete surfacing. The tack coat of 0.1 gallon to the square yard of RC-1 asphalt was applied half width, or 20 feet, for a linear distance of 4,500 feet at a time, which was the

by the Asphalt Service Co. of Baltimore.

The bituminous-concrete base course, 2½ inches thick, was then laid in 10-foot lanes by a Barber-Greene finisher and rolled by two Buffalo-Springfield 10-ton tandem rollers. The entire width of base course for a given section was put down before the 1½-inch top course was laid with the same equipment, giving a total pavement thickness of 4 inches. Spreading the surface course followed the base course in from one to five days. About 1,500 feet of double 10-foot lanes of base course was laid in a 10-hour day, which average was increased to 2,000 feet when the top course was being spread.

The Eastern Highways Corp. has its own Cummer asphalt plant of 1-ton capacity at Brooklyn, Md., about 11 miles from the job. Twelve trucks, holding from 6 to 8 tons, were used to deliver the plant-mix at a temperature of 275 degrees F to the finisher. Half the trucks were contractor-owned and the other half were hired by the ton-mile haul; all were equipped with tarpaulins

to retain the temperature of the hot-mix. At the end of a day's work, barriers were erected to keep off traffic until the next morning when the mix had cooled and hardened sufficiently to sustain the weight of cars and trucks. Joints were straight-edged, cut back with an asphalt cutter, and painted with hot asphalt before starting the next day's run.

Material for the plant-mix came from three different sources: asphalt, with an 85 to 100 penetration, came from the Mexican Petroleum Corp. at Baltimore; sand, purchased from the Arundel Corp. in Baltimore, was delivered to the plant in trucks; stone was supplied by the Bethlehem Mines at Bethlehem, Pa., and was hauled the 85-mile distance to the contractor's asphalt plant also in trucks.

The Mix

The proportions of a typical batch of each course of hot-mix are given in the following table:

(Concluded on next page)

THE 1946

Are Ready

Paving Contractors and Engineers
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Gentlemen:

The soundness of the "Translode" principle of load transfer in concrete permanent construction has been proved by the satisfactory performance of millions of feet of Translode joint installed under varied climatic and regional conditions during the past fifteen years.

During these years we have been working constantly to improve design features and lower the cost. The 1946 Translode expansion joint is ready. It is priced lower, but designed for greater efficiency.

A combination of the Translode expansion joint and the Keycode contraction joint will provide the 1946 ultimate in joint efficiency. This combination will protect the life of concrete highways, airport runways and city streets.

They merit your careful consideration. Circulars available on both.

Very truly yours,

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President

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Heavy Resurfacing For 4-Lane Highway

(Continued from preceding page)

Sieve Size	Per Cent Passing	
	Base Course	Surface Course
1-inch	100	100
½-inch	77	82
No. 4	40	47
No. 8	33	39
No. 10	...	34
No. 20	...	26
No. 40	...	...
No. 50	13	12
No. 80	...	6
No. 200	1	6½
Asphalt	6	6½

After the top course was laid and while it was still hot, it was covered with a hot dressing composed of slag screenings and asphalt shoveled on by hand from a truck at the rate of from 2 to 4 pounds to the square yard. The screenings were graded from the No. 10 down to No. 200 mesh sieve, to which was added 4 per cent by weight of the same 85 to 100-penetration asphalt used in the plant-mix. This dust was worked well into the voids in the surface by having a drag broom pulled over the black-top by a truck. The drag broom was 14 feet long x 10 feet wide and was equipped with four rows of 6-inch fiber bristles, a row in front and back, and two placed diagonally. A man stood on top of the broom, while it was being pulled around, to enhance the brooming process. After the brooming the surface was given another rolling.

In addition to the truck drivers, a force of seventeen men worked on the hot-mix paving: the foreman; three equipment operators, one on the Barber-Greene finisher and two on the rollers; two men on the screed controls of the finisher; one man dumping trucks; two rakers; one man on the broom; and seven laborers who did all the shoveling required with the hot-mix, flagged traffic, and also spread the dust which had been mixed at the asphalt plant. A pail of fuel oil was carried along in which the shovels and rakes were dipped for cleansing.

The new smooth but not slick black-top surface has a center crown of 6 inches over its 40-foot width, which is flanked by 5-foot shoulders of gravel with a depth of 9 inches, put on in two courses with material obtained from a borrow pit adjacent to the pit used for the subgrade. A period of two weeks elapsed between courses of shoulder gravel. Each course of gravel was compacted by rolling. Later on, after the shoulders were completed by the contractor according to specifications, the maintenance forces of the State Roads Commission gave the shoulders a surface treatment of asphalt or tar, and then covered that with a layer of gravel chips, ¾-inch down, and rolled well.

Items and Personnel

Work on this contract started the middle of May and was finished at the end of September. The contract included the following major items:

Excavation, patching and shoulders	2,870 cu. yds.
Excavation, underdrain	1,390 cu. yds.
Perforated-pipe underdrain, 6-inch	7,150 lin. ft.
Patching 9-inch concrete pavement	2,960 sq. yds.
Gravel sub-base	1,170 cu. yds.
Gravel shoulders	10,560 sq. yds.
Tack coat, bituminous material	6,100 gals.
Base course, 2½-inch	7,800 tons
Wearing course, 1½-inch	4,890 tons

For the Eastern Highways Corp., Harry Gaither was Superintendent and Ivan P. Bryant was Foreman. The contract was executed under the direction and supervision of Maryland State Roads Commission engineers and inspectors.

Electrode-Selection Data

Welders will find handy a calendar-like wall chart issued by the Hollup Corp. to aid in selecting the proper electrode for a given task. Mild, low-alloy, and stainless-steel electrodes, non-ferrous and cast-iron electrodes, surfacing electrodes, and gas-welding

rods are presented. Various items of information concerning the electrode, suggested uses, currents, positions, physical characteristics, etc., appear on the guide.

Copies of the Selectrode Chart can be secured on request. Hollup Corp., a Division of the National Cylinder Gas Co., is located at 4700 W. 19th St., Chicago 50, Ill. Mention this notice when writing.

Ribbed Conveyor Belt Reduces Load Slippage

The slippage of materials on conveyor belts not only wears out the belt more rapidly but also reduces the efficiency of the conveyor system. To offset such slippage, the American Rubber Mfg. Co. has developed a ribbed conveyor belt, the Lightning, which features raised "treads". These treads are said to grip the materials on the belt into pocket-like divisions so as to hold the load tight, even on steep inclines.



The feature of Lightning conveyor belts is the raised "treads" to prevent slippage of material.

As a result, the belt-wearing abrasion of slipping materials is reduced. When the ribs wear off the belt, it can be pressed into service for flat conveying

duty.

An inquiry to the American Rubber Mfg. Co., Oakland, Calif., will bring further details. Mention this CONTRACTORS AND ENGINEERS MONTHLY news item.

Don't Tie Up Capital!

There is no need for a contractor to tie up valuable working capital when buying construction machinery and equipment, the C.I.T. Corp. says in a recent broadside. The firm offers to finance the purchase of equipment on extended terms that will permit the machinery to pay for itself over a period of time. Easily arranged and furnished at low cost, the C.I.T. system makes possible the purchase of equipment from several distributors at once if desired.

More complete information can be secured from C.I.T., 1 Park Ave., New York 16, N.Y., or from its offices in Chicago, San Francisco, Los Angeles, and Toronto.

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300 H.P. WALTER TRACTOR TRUCK with 20 Cu. Yd. Side Dump Trailer. Carries up to 40 ton payloads, speeds 25 m.p.h. on the level, 8 m.p.h. on 10% grades; negotiates 15% and 20% grades. Highly maneuverable, easily handled.

- **HAUL HUGE LOADS.** Walter Tractor Trucks are hauling 20 Cu. Yd. Trailers—12 Cu. Yd. Dump Bodies, in toughest running conditions.
- **HAUL ON ANY TERRAIN, IN ANY WEATHER.** Walter Four Point Positive Drive provides 100% traction in all FOUR driving wheels to navigate mud, sand, steep grades and slippery surfaces. Three automatic locking differentials proportion power to each wheel according to traction. High ground clearance prevents "hanging."
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- **SHORT TURNING RADIUS.** Engine-ahead-of-wheels design shortens wheelbase, provides correct weight distribution, improves maneuverability.
- **WIDE GEAR RATIO.** Tractor Type Transmission provides wide gear selection—ample for any emergency. Suspended Double Reduction Drive increases gear capacity.
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- **MINIMUM MAINTENANCE.** Users consistently report much higher availability than other trucks under similar conditions.

● Why try to get along with less when you get **complete** off-the-road haulage with Walter Tractor Trucks? They increase your yardage, speed your jobs and lower hauling costs all around. Their greater capacity enables you to work with fewer units, reducing congestion as well as expense. Write today for complete information.

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200 H.P. WALTER TRACTOR TRUCK with 12 Cu. Yd. Back Dump Body. Hauls 20 ton payloads. Provides big truck capacity in short hauls, and congested areas. Fast, maneuverable.

Book Discusses Dredges And Dredging Practice

American dredging practice, yesterday and today, is discussed in a well illustrated 56-page catalog just published by the Ellicott Machine Corp.

Engaged since 1885 in building dredges, the Baltimore firm fabricates complete dredge units, makes a variety of dredging machinery, and will supply dredging apparatus for installation on hulls constructed by other ship builders.

Buying a dredge is an investment that may involve anywhere from \$30,000 to \$2,000,000, the catalog points out. The

firm's service includes designing, manufacturing, erecting, and delivering the finished dredge.

The booklet discusses at some length the modern practice of dredging. Much attention is given to hydraulic dredges of the pipe-line and sea-going hopper types. The firm's history, background information on the advancement of dredging science, and details concerning special-purpose dredges and machinery made by Ellicott complete the presentation. Many famous dredges are shown in action on projects in the United States and elsewhere.

Copies of this interesting illustrated

catalog can be secured by writing the Ellicott Machine Corp., 1611 Bush St., Baltimore 30, Md. Mention this review.

Raybestos Promotions

The advancement of two members of its sales staff has been announced by the Raybestos Division of Raybestos-Manhattan, Inc. Harvey G. Arentzen, formerly Manager of the Northeastern District, has been assigned to special sales duties at the main office in Bridgeport, Conn. He has been replaced by M. J. Callahan, a member of the sales staff for 24 years.

Gar Wood Staff Shifts

The appointment of R. J. Nymberg as Sales Manager of the Hoist and Body Division has been announced by Gar Wood Industries, Inc., Detroit, Mich. Ross Miller, District Manager for the general line at Philadelphia, is temporarily acting as Manager of the Hoist and Body Division, following the retirement of A. E. Hilderley. Edward F. Kreutzfeld has been named Service Manager of this Division, and Henry Husbands has been assigned as Assistant District Manager for the general line at Washington, D. C.

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Paving Joints, Cracks Are Subject of Survey

PRA Engineers Report on Findings of Michigan Project; 110 Miles Were Studied; Conclusions

“SOME adequate structural connection between the ends of pavement slabs meeting at a transverse expansion joint is an essential part of a good joint design, even though the slab ends themselves are structurally adequate,” research men of the Public Roads Administration have concluded from a study of transverse-joint conditions on a number of older concrete roads.

Begun in 1938, the study was carried on in cooperation with the Michigan State Highway Department on a number of heavily traveled routes whose pavements were generally 10 years old or more. The findings have been reported by Earl C. Sutherland, Senior Highway Engineer of the PRA, in the first quarterly issue of *Public Roads* for 1946.

Designed primarily to develop information concerning the condition of transverse joints without provisions for load transfer, the study sought evidence of weakness in the joint area and other undesirable conditions attributable to the absence of structural connections. About 110 miles of roads were studied, 46 miles being examined in detail. Slab thicknesses were 7 inches or more.

Breaks at slab corners and longitudinal cracks extending from transverse joints to transverse cracks which could be deemed the result of structural weakness were found only in isolated cases. The formation of transverse cracks near transverse joints, studied carefully, was found to be constant for both the traffic approach slab and for that beyond the joint. Pavements that had only slightly faulted joints suffered as many cracks as those badly faulted.

“The data indicate that the majority of the transverse cracks that occurred near transverse joints were caused by combined load and warping stresses across the section where the crack formed and that the absence of load transfer in the nearby joint was not primarily responsible for their formation,” the report states.

The faulting of joints was found prevalent to an undesirable extent in all the older pavements examined. Evident in pavements laid on all types of subgrades, this vertical displacement was found to occur more frequently on clay-type subgrade material. Faults at transverse cracks were less in magnitude than at the joints, and were said to constitute no problem.

“It is thought that both the longitudinal-joint construction and the use of edge-bar reinforcement have been beneficial in maintaining slab alignment at transverse cracks,” the report says. “On the other hand, faulting at joints had in many cases developed to an objectionable extent and there is no doubt that, had there been some suitable structural connection in the transverse joints, the condition that existed would not have developed.”

Other Conditions Observed

Certain collateral information was assembled in the study. It was found that concrete pavements with expansion joints at about 100-foot intervals and no contraction joints tend to be reduced by transverse cracking to 15 to 20-foot slabs. The greater part of this cracking occurs during the first 4 years of pavement life.

If the traffic volumes at the time the pavements were examined can be accepted as an index to the relative amounts of previous traffic, it must be concluded that the amount of transverse cracking ultimately developed

bears little or no relation to the total number of vehicles or to the number of heavy wheel loads that pass over the pavement, the investigators felt.

Pavements that contain distributed reinforcement appeared to be in better condition than plain-concrete pavements of the same age, the report says. Too much steel used as tie bars across a longitudinal joint may contribute to longitudinal cracking by restraining warping and by preventing proper adjustment or seating of the pavement on the subgrade in case of unequal expansion or subgrade settlement.

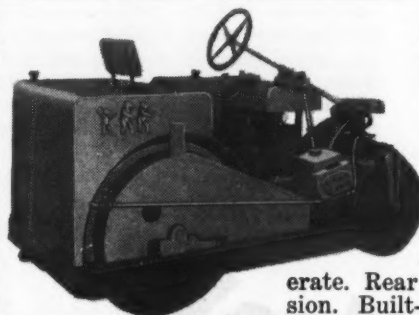
Other findings indicated the importance of maintaining the expansion joints in a condition which permits free movement of the slab ends. The evidence leads to the belief that an adequately reinforced concrete pavement slab requires less expansion space than one not reinforced. The gradual closing of expansion joints with time seems to be primarily the result of the gradual opening of transverse cracks between joints. To maintain the normal func-

tioning of the joint, it appears necessary either to eliminate cracking or to use steel reinforcement in order to prevent openings at the cracks that do form. In spite of the fact that the joints were often closed or filled with tightly packed

soil, no evidence of “blow-ups” was found during the survey.

While not prevalent, the “infiltration crack” was deemed sufficiently frequent to merit attention. Though probably

(Concluded on next page)



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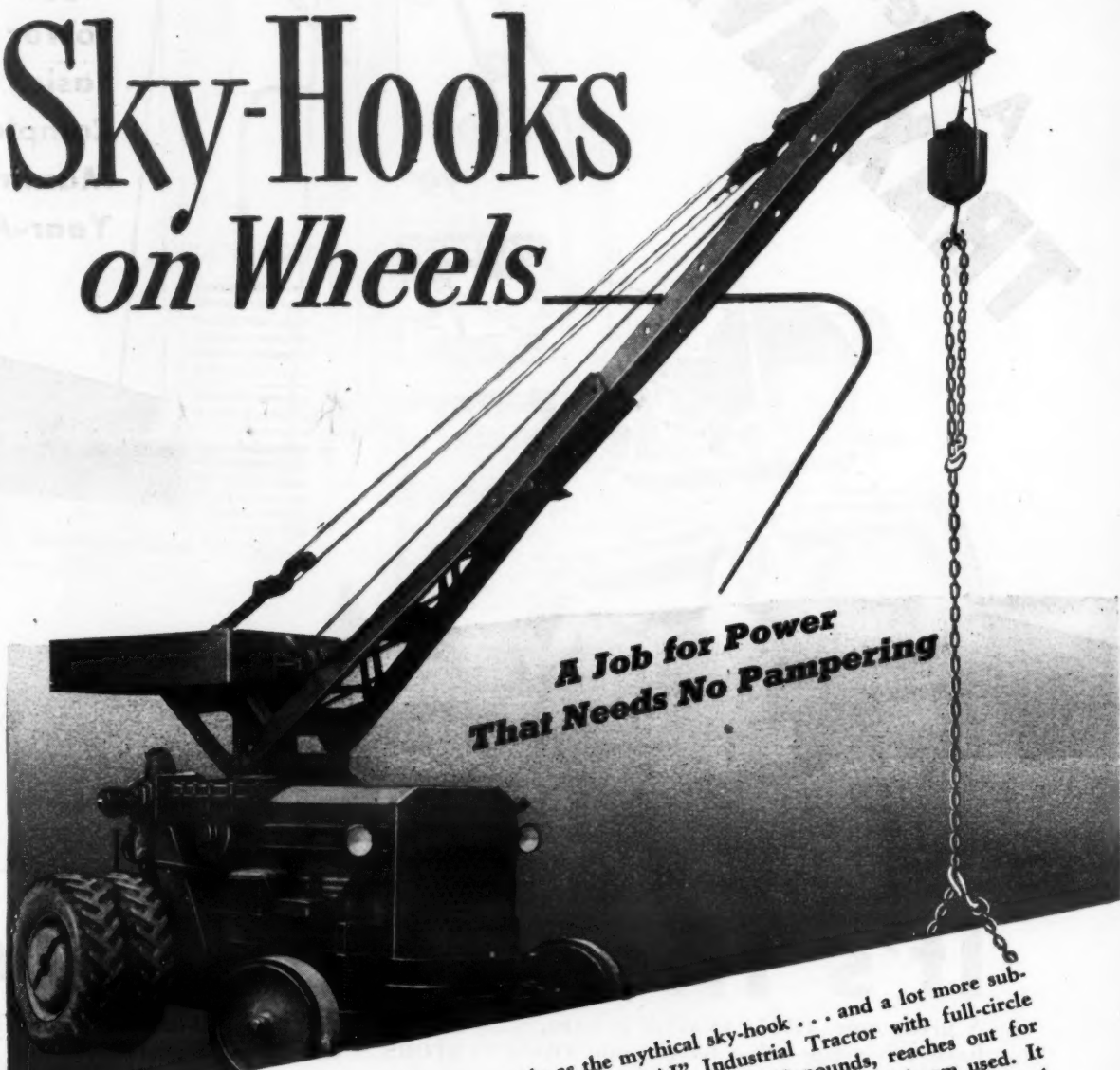
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Paving-Joint Survey

(Continued from preceding page)

not the result of a single cause, the impacted condition of the expansion joint, particularly near the pavement edge, is believed an important contributing factor.

Copies of the first quarterly issue of *Public Roads* for 1946, containing the complete report on this study, are available gratis to state and county highway officials. Others may secure copies at 15

cents each from the Superintendent of Documents, Government Printing Office, Washington 25, D. C.

Westinghouse NE Manager

L. E. Lynde, winner of the Westinghouse Order of Merit in 1942, has been appointed Manager of the New England District, with headquarters in Boston, the Westinghouse Electric Corp. has announced. He has been with the firm since 1920.

Service-School-on-Wheels

Instruction in the correct methods of maintenance and repair of diesel engines is being given by two caravans of the Detroit Diesel Engine Division of General Motors, which are currently traveling through the eastern and western halves of the nation. Starting from the Western Machinery Co., St. Louis, the units will hold conferences at which representatives of GM diesel distributors and service outlets will be pres-

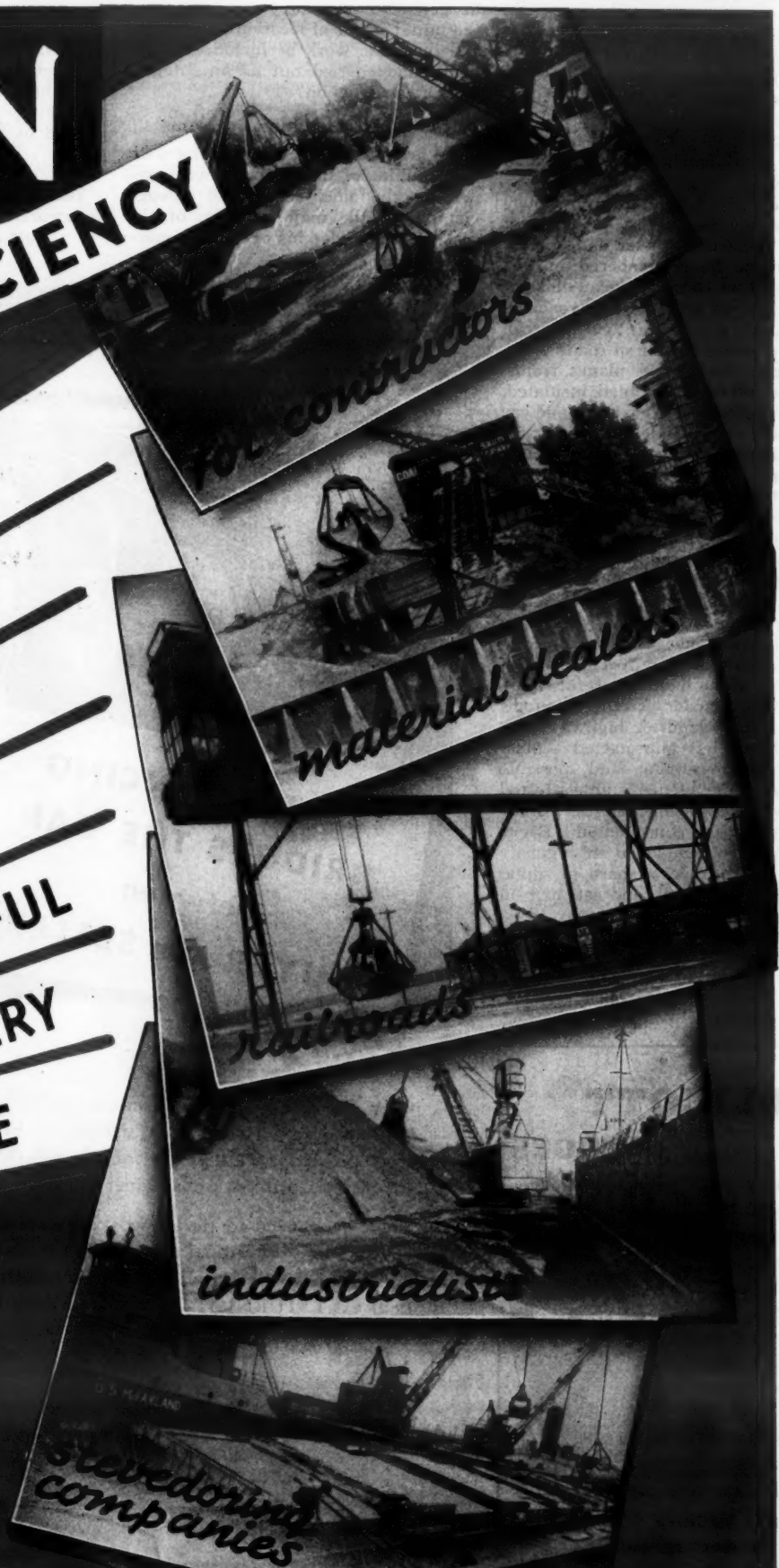
ent. On their 12,000-mile itinerary, the caravans will demonstrate, through prepared charts, films, slides, and actual shop work, the best methods of servicing diesel-powered equipment.

Urban in U.S. Rubber Post

Frank M. Urban has been advanced to the post of Merchandise Manager for the Mechanical Goods Division, the New York headquarters of the United States Rubber Co. has announced.

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Roadside Development In New Construction

Stress on Basic Tenets Will Reduce the Costs of Maintenance in Future Highway Programs

THE part that roadside development should play in the coming highway construction season, with emphasis on the future savings in maintenance, was the subject of a paper presented by Wilbur H. Simonson, Senior Landscape Architect, Department of Design, Public Roads Administration, at the 1946 Purdue Road School. The basic tenets of roadside development were restated in this paper, an abstract of which follows:

Highway departments are now busy on plans for the largest program of highway construction ever undertaken. The point to be remembered in this work is that we cannot have an efficient highway system without sound roadside development any more than we can have an effective system of roads without bridges. Tomorrow's planes, trains, and buses will be streamlined, insulated, and air-conditioned. New truck and car designs will also include the latest service features. If highway construction is to keep in step with these developments, the practical answer is an all-purpose balanced highway development, streamlined and "erosion-proofed" for safety and low-cost maintenance.

Full consideration of roadside development should be given in widening and resurfacing old and war-torn roads, and in building new highways. Surface courses normally occupy about one-fourth of the width of useful right-of-way, which means that three-fourths of the width of land for highway purposes will be left unprotected against washing and gullying and possible undermining of pavements unless tested roadside-improvement practices are incorporated in the construction. Every office and field employee in highway work, therefore, has a share in sound roadside development, and can help in seeing to it that the practical advantages and service benefits of roadside development are realized in highway construction and maintenance programs. To do this, we must cease to

act as if roadbed and roadside were separate problems but should combine them in a single construction program.

What are some of the everyday difficulties of the highway maintenance engineer? How can costs of up-keep be kept down in local highway budgets? Why is it so vital that full consideration be given to roadside improvement in the initial stages of location and design, and the basic work be included in the plans, and carried out as an integral part of construction?

Major Maintenance Problems

We are all more or less familiar with the troubles of the maintenance engineer on the older sections of mileage making up the major portion of the road system under his care. The nar-

row cross section of our older roads with V-shaped ditches, steep slopes, and sharp edges at slope intersections was a natural carry-over of railroad cross section in early highway work. Today, as a result, the maintenance engineer is constantly trying to overcome sloughing of shoulders and side slopes, and undermining and falling of fences at the tops of cuts; the plugging of pipes and clogging of culverts, and silting of ditches and drainage channels; and the hazards of projecting headwalls, guard rails, and other structures, and lack of pedestrian paths and footwalks. For erosion prevention and ease of maintenance, an improved cross section has been developed, with wide shoulders, rounded gutters, flattened slopes warped into the topography, and an adequate vegetative cover over all areas disturbed by construction.

Important Objectives

Basic roadside improvement in new construction and reconstruction projects (Concluded on next page)

Roadside Development A Definition

The modern highway was evolved from the railroad, and yet by nature is different from a railroad. From the beginning, railroads prohibited persons living adjacent to them from entering railroad property. Steep cuts and fills and high fences aided in this. Highways, on the other hand, are meant for people who live and work beside them.

This basic character of a highway means that, unlike a railroad, the highway must fit into the countryside, be free from visible scars of construction, be well drained, easily maintained with modern equipment, protected from erosion, provided with a reasonable amount of shade, and, above all, be capable of safe and convenient use by the public from fence to fence. A highway must be more than a mere traveled way; it must also be safe and convenient for use by drivers. Roadside development is another word for all these things.

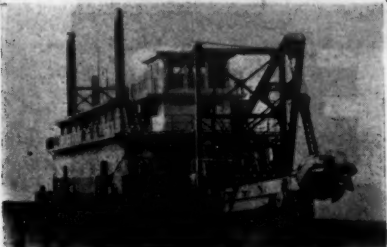


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Roadside Development In New Construction

(Continued from preceding page)

ects is the most effective and economical means of eliminating unnecessary erosion and drainage difficulties in highway maintenance. Furthermore, when carried out as an integral part of construction operations, sound roadside development achieves the following:

1. Increases traffic safety by improvement in the cross section and design of shoulders, gutters, and slopes, and of median areas of divided highways.
2. Provides for the comfort and convenience of the public with sites for turnouts, scenic overlooks, and roadside parks.
3. Improves highway appearance, including architectural features of all structures, and thus protects the public investment in the highway as well as private and public investment in lands adjoining the highway.
4. Facilitates use of modern types of construction equipment, thus eliminating much handwork and lowering unit costs of excavation operations.
5. Controls snow drifting on the highway and encourages the use of power-operated mowing and snow-removal equipment, thereby reducing annual highway-maintenance costs.

Basic Construction Items

Experience has made it clear that the following basic construction items may be performed most effectively, and at lowest cost, as a "built-in" part of highway plans, specifications, and estimates:

1. Conservation and protection of major landscape features by adjustments in location before plans are prepared, including salvage of topsoil, sod, stone, and other local materials for use on the project. It is infinitely better, where possible, to preserve that which is available. Make the most of fine trees, strips of woodland, weathered rock outcrops, springs, shorelines, and natural sites suitable for waysides.
2. Grading and shaping of slope and drainage areas, and protection of all disturbed areas against erosion, including obliteration of abandoned roadways, structures, and borrow pits. It is important to restore the roadsides to natural contour form, planted with the kinds of grass, vines, shrubs, and trees that existed there before the highway was built.
3. Shoulder surfacing and widening as required at mail boxes and bus stops, including provision of turnouts at scenic and other points where many motor vehicles tend to stop.
4. Construction of footwalks, paths, and other pedestrian facilities, including essential sidewalks and safety walks on bridges.
5. Development of selected safety and service turnout areas and waysides, including grading, drainage, surfacing of drives and parking spaces, installation of retaining walls, and water supply and sanitary facilities as needed.
6. Planting of trees and other vegetation to facilitate maintenance operations, for traffic guidance, screens and

snowbreaks, and for other safety purposes. Other related work includes selective landscape thinning and cutting, tree pruning, roadside clean-up, and the opening up of roadside views.

7. Final landscape development of safety and service turnouts and wayside parks, and the planting of trees and other vegetation for safety, erosion control, screens, and windbreaks.

The need for these basic steps in roadside development will largely depend upon traffic conditions, prevailing use of adjacent lands, and upon local topography, soil, and climate, on each highway construction project. While landscape development will normally be much more intensive on high-type urban or suburban roads with heavy traffic than on lower-type highways with light traffic, at great distances from centers of population, there is need for good grading, drainage, and erosion protection on all types of roads, whether on the county, city, or state system.

Good judgement by trained professional landscape architects or landscape

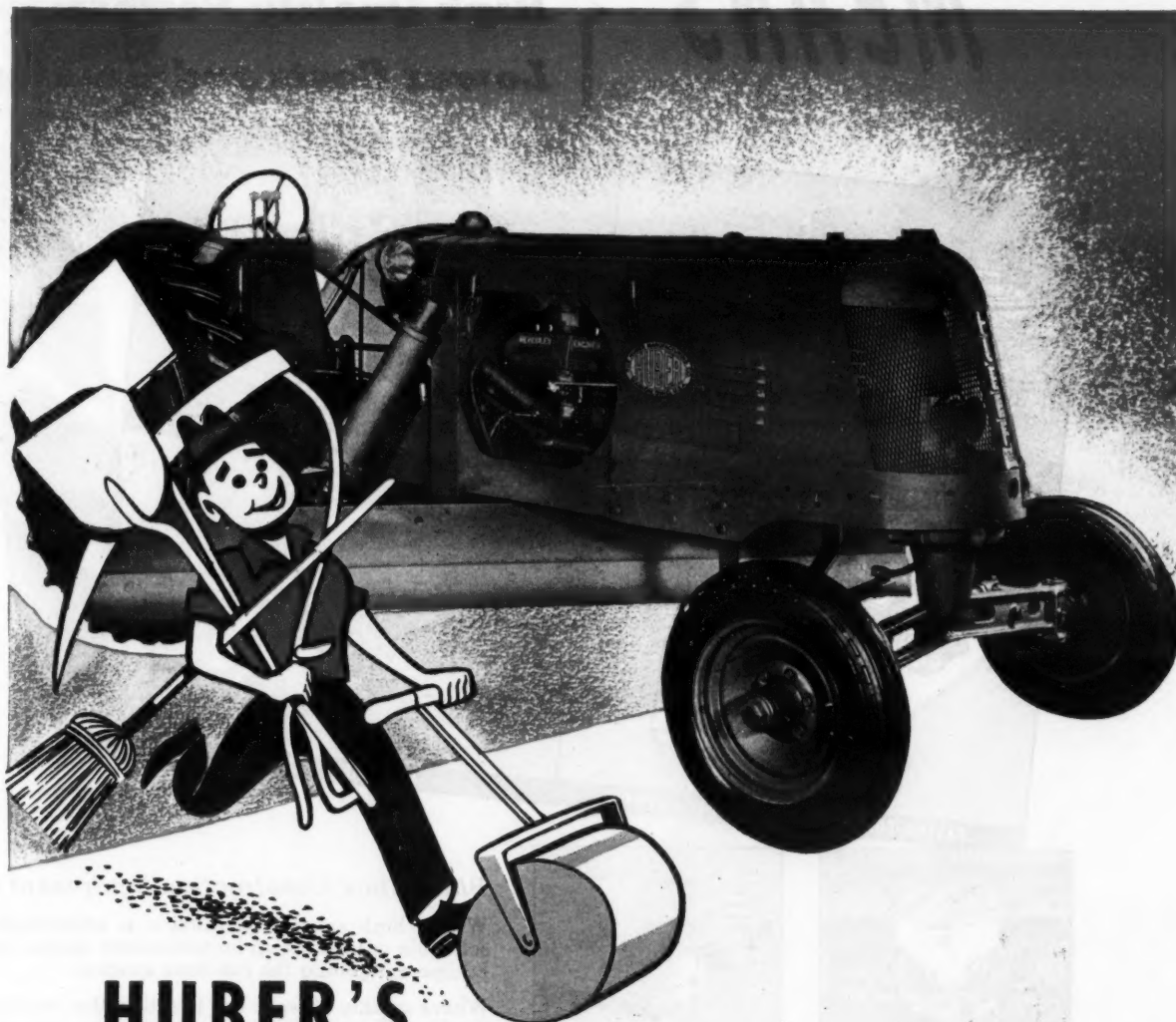
engineers employed by the states will go far towards rendering highway landscape development relatively low in cost and high in effectiveness. Common-sense teamwork of highway and landscape engineers from start to finish will make possible in each state the objectives of complete highway safety, service, appearance, and economy.

Complete Highway Development

The coordination of roadbed and roadside construction and maintenance should result in even finer and more efficient highways than have been built in the past under separate operations. The objectives of highway safety, highway service, highway appearance, and highway-construction and maintenance economy need to be given fullest consideration in the preliminary stages of highway location and design. If a complete highway improvement is to be attained at the lowest cost and turned over to the maintenance department intact, these basic provisions should be included in the plans, specifications, and

estimates.

We know that the test of a sound highway-building program is the ability of a county, city, or state safely to operate and maintain the system of roads and streets for which it is responsible. We know also that the objective of providing the public with all-year-round highway service calls for the soundest construction possible. Especially in times of blizzard and flood will hidden weaknesses in the highway structure be likely to show up and give trouble to the highway maintenance engineer. And finally, we know that when highway builders pay more attention to the troubles of the maintenance engineer, and incorporate such experience in the plans for construction, we will have safer and more easily maintained highways. Unless roadside work is completed when the construction is turned over to maintenance, there is likely to be a strain on the maintenance budget which might become excessive as the system of road mileage is increased.



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Stilwell Road Takes On "The Glory That Was Rome"

"So passes worldly fame" might well be the comment made at the recent announcement by the Government that the famous Stilwell Road is to be abandoned. Formerly the Ledo Road, the wartime highway, together with eleven military airfields in Burma, has been given up as useless insofar as regaining some of its cost through sale or salvage is concerned.

Monsoons, maintenance, and lack of

interest on the part of the countries it traverses are responsible for the abandonment of the highway that cost America \$137,058,000 plus a reciprocal-aid investment of \$11,852,000. The abandoned airports cost \$15,000,000.

The United States investment in the Stilwell Road is almost entirely represented by work done, rather than by installed equipment, so that salvage operations would cost more than they would be worth. Bailey and H-20 bridges in deteriorating conditions comprise most of the American equipment

in the road, and they are in such remote locations as to have no feasible means of recovery. To maintain the road in operating condition would require more than 12,000 U. S. troops and 11,500 native laborers.

Worthington Appointment

The appointment of P. A. Alers as Manager of the El Paso, Texas, office of the Worthington Pump & Machinery Corp., has been announced. He has been associated with the firm since 1933.

Steam Cleaner Described

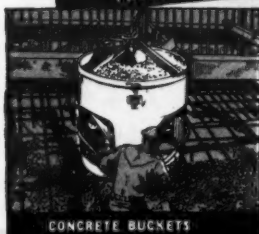
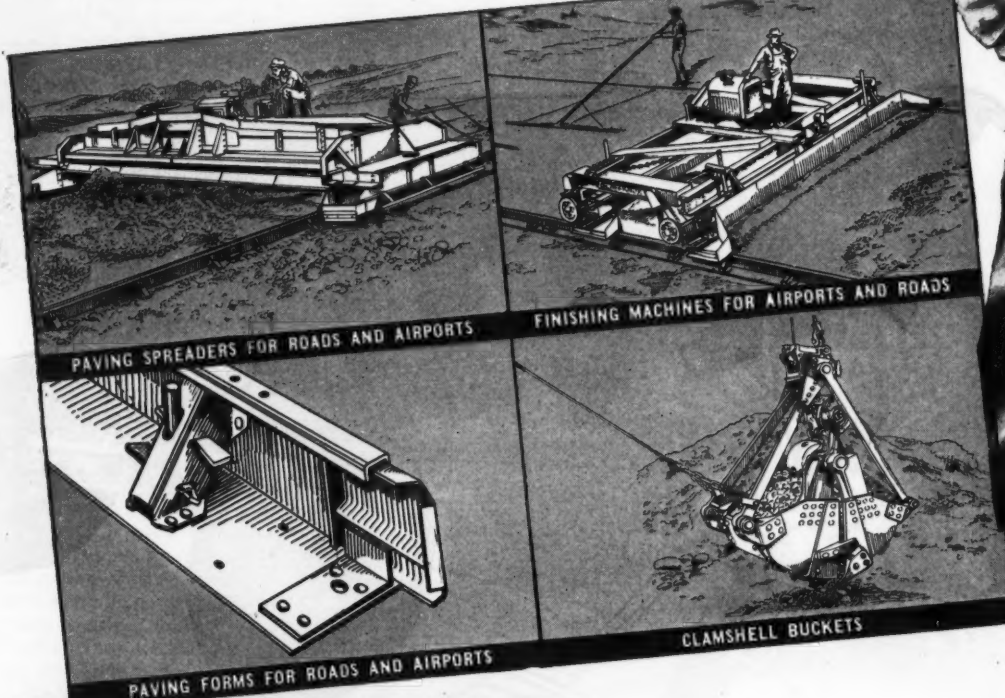
Highway department equipment-maintenance men and operators of construction machinery will be interested in a folder on the Siebring portable steam cleaning machine for heavy-duty cleaning. This unit is one-man-operated, automatic, and is independent of electricity or city water pressure. It is built in 30 and 40-gallon capacities.

The bulletin may be obtained by mentioning this notice when writing to the Siebring Mfg. Co., George, Iowa.

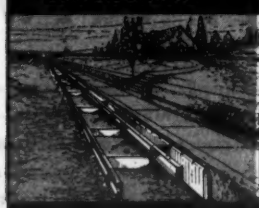
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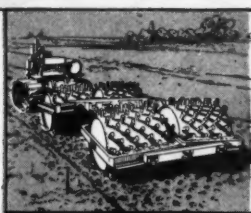
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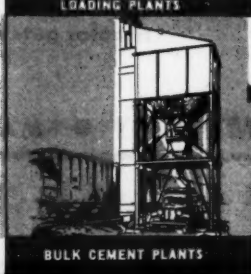
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BLAW-KNOX CONSTRUCTION EQUIPMENT

County Speeds Loading Of Gravel by Machine

Crawford County, Ark., Home Of Bob Burns' Relatives, Maintains Its Rural Roads Despite Small Budget

✦ CRAWFORD County, Ark., has changed. Bob Burns' fans will be interested to know that it's no longer necessary to swing in to Van Buren on a grapevine. They have roads now.

Probably the nation's most famous rural county, it lives for us on the Bob Burns' broadcasts as the home of Grandpaw Snazzy, Aunt Boo, Cousin Walfred, and Uncle Glut, Bob's drinking uncle. Listening to these broadcasts, we might well believe that the actual Crawford County is a community of moonshiners, of backwoods hillbillies, of feuds and simple ways. Actually, that is not the case.

While there are scattered mountainous districts in the north, Crawford County is primarily agricultural because of gently rolling or bottom land near the Arkansas River. Its citizens are progressive; they have good schools, libraries, and roads. Those who drink corn whisky can buy it at a liquor store. If the county is quaint, it is only because its people are honest and courteous. The nearest thing to a feud in Crawford County today is a sort of battle in the County Road Department between hand labor and machine loading of gravel for county roads, and County Judge S. M. Denniston has already found in favor of the defendant: an International TD-9 with a Dozer-Shovel.

The county is situated in the center of the extreme western part of the state of Arkansas, near the Oklahoma state line. It maintains 750 miles of county roads, including 250 miles of gravel, 450 miles of graded earth, and about 50 miles of unimproved trails. The yearly budget for maintenance and upkeep of this road system, \$30,000, is considerably less than the annual take of the county's illustrious bazooka player in Radio Center, Hollywood, Calif. But this proper upkeep is no laughing matter, for part of the nation's cotton; vegetables, farm produce, and supplies move over these roads towards Van Buren, Fort Smith, and the nation's markets.

Gravel for Roads

County Judge S. M. Denniston, who formerly was active in the contracting business, has made a careful study of handling gravel for county highway repair. Like many rural county engineers, he decided that the loading of gravel by hand into dump trucks was unfair both to the truck and to the taxpayers. When he decided on mechanical loading, the Judge drove his automobile around through the state to watch various mechanical units at work.

The front-end tractor-loader seemed to be the answer for Crawford County, for this is a multi-purpose machine. Judge Denniston noticed, however, that some loaders were front-end heavy; that a full bucket caused the tractor to lift clear of the ground in the rear. On the unit he selected, therefore, the tractor is mounted on longer tracks than are common on conventional models of the TD-9. The Crawford County machine, which the people of this community were fortunate enough to buy during the war, is a Bucyrus-Erie Dozer-Shovel mounted on an International TD-9 tractor. Bucket control is hydraulic, and the machine also has a bulldozer blade which can be interchanged with the ¾-yard scoop.

Before this machine was purchased, it was the rule to send two or three laborers out on each dump truck. They

were lucky to haul three, or four loads at most, on the roads. Now, if working conditions are such that the five county-owned trucks can work a section simultaneously, this Dozer-Shovel loads continuously. Five trucks, working recently on a short haul, moved 500 cubic yards of gravel in 10 hours.

If only one or two trucks are working, their drivers load their own trucks. The machine requires about 3½ minutes to load a 3-yard Ford dump truck. Working singly, it has increased truck output from 3 to 12 loads a day, meanwhile doing away with excess labor. Wherever possible, however, enough trucks are assigned to allow both the Dozer-Shovel and the trucks to operate efficiently.

Since mechanical loading has been



C. & E. M. Photo
Crawford County's Bucyrus-Erie Dozer-Shovel on an International TD-9 loads creek gravel for roads into one of the County's five Ford dump trucks.

started, many farmers on county roads, who would never think of imposing on a labor gang, now drive their own trucks, wagons, or pick-ups over to where the Dozer-Shovel is working and haul gravel to their roads. Every load

that these sometimes nondescript vehicles haul constitutes a road betterment absolutely free to the taxpayers.

The county abounds in alluvial gravel or clay-gravel pockets, and a generous
(Concluded on next page)



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C. & E. M. Photo

Judge S. M. Denniston (left) in charge of roads in Crawford County, Ark., visits the work of his operators regularly. Here he is shown with R. E. Hatfield, tractor operator.

County Speeds Loading Of Gravel by Machine

(Continued from preceding page)

supply can usually be located free of charge on land within 2 or 3 miles, at most, of the job. The loads are dumped along the side of the county roads, and then spread by a motor grader or a pull grader the same day. Low grades on Crawford County roads are constantly being raised by this method. Frost boils and soft places are repaired the same way.

During the summer months the three pull graders, four motor graders, and Dozer-Shovel work continuously. Judge Denniston has placed a motor grader and pull grader at various districts and assigned them enough highway to keep them busy. Control of the machines and their operators is thus centralized through his office. He figures that a motor grader will dress 10 miles of county road in a 10-hour shift, and that a pull grader will pull about 5 miles of ditch in the same period. Crawford County uses Caterpillar No. 12 motor graders, and Caterpillar pull graders behind Caterpillar tractors.

Organization

County equipment operators are their own bosses, subject only to Judge Denniston's orders which he delivers personally on the job. He visits each of his gangs at least once each week and oftener if extensive grading is under way. Each man reports his time to the Judge's office on a penny postcard, noting the hours worked, equipment involved, the locality improved, and any unusual features of the work. Once each month these cards are posted on a payroll, usually by the Judge himself to save clerical expense, and the pay warrants are then ready on the 25th of the month when the men come in to collect them. Road bossing takes up nearly all the Judge's time.

"What few juvenile cases I hear usually come before me at a time I set when road work is at an ebb," he explained.

County-road revenue is derived from the Arkansas state millage tax (3 mills ad valorem), a proportionate return to the County from the 6½-cent-per-gallon state gasoline tax, and a part of the state sales tax which is diverted to road maintenance.

"We are fully aware here that we are a poor county," Judge Denniston said. "Our system cannot compare with a richer county's methods because of our extremely low budget. We are simply trying to hold to a line at this time: to put as much of our yearly cash as possible on what roads we do have, with as little waste as possible."

New Material Hoist Is Electric-Powered

A simple movable hoist for a wide variety of material-handling services, the Roll-O-Hoist, has been announced by the Construction Machinery Co., Waterloo, Iowa. The unit has a platform capacity of 500 pounds, 20 feet of track, and is powered by a ¾-hp single-phase 110-220-volt 60-cycle electric motor mounted on a truck with two pneumatic-tired wheels. Where electricity is not available, the Roll-O-Hoist can be powered by a CMC 1-kw ac generating plant.

The Roll-O-Hoist is described in Bulletin RH-46 available on request by writing direct to the company and mentioning **CONTRACTORS AND ENGINEERS MONTHLY**.

Georgia Road Repairs

"It is a poor investment to spend millions of dollars in paving roads and then to let them go to pieces," Governor

Ellis Arnall of Georgia stated apropos of his recent transfer of \$3,000,000 from the state's emergency fund to the State Highway Department. Wartime wear and a particularly bad winter created a need for extensive road repairs and made the fund transfer necessary.

The State spent more money on roads during the war than it received in gasoline taxes, Governor Arnall revealed. Its 1946 road-building program, set for

\$32,000,000, will be the largest such expenditure to date.

B-S Dealer in Georgia

The complete line of Buffalo-Springfield rollers will be handled in southern Georgia by the Tri-State Tractor Co., the Buffalo-Springfield Roller Co. has announced. Tri-State has offices at Washington at First St., Albany, Ga.



LIKE A CHAMPION VAULTER...



FORM-SET ROPE

IS relaxed

You marvel as his body clears the bar, then falls through space in a graceful arc. Thirteen, fourteen, fifteen feet he drops, yet he lands unhurt... because he's relaxed.

When handling Form-Set, Bethlehem's preformed rope, you'll notice much of that same relaxed effect. The reason is, of course, that the preforming process shapes each wire and strand to a permanent helix—a shape they retain through the life of the rope. Even though the rope be cut or broken, the wires and strands "stay put." They don't bush out or pop from the core.

This is because the tension is gone—relieved by preforming. The rope is relaxed.

What does this bring you? Easier handling, for one thing. More important still, a preformed line is much less subject to bending fatigue. On applications where bending stresses are high, a Form-Set rope has longer life. This means greater economy... fewer replacements... fewer reriggings.

No matter what rope you want—no matter what grade, type, or size—you can get it with the Form-Set feature. Details are available through the nearest Bethlehem representative.



This is Form-Set rope. The strands have been lifted out by hand. Note how the wires lie smoothly in place. There is no inner tension to force them apart.

When you think WIRE ROPE... think BETHLEHEM





The American No. 8 grader is designed for year-round service in both road construction and maintenance.

Light Motor Grader Is Strong, Versatile

Designed to handle heavy cuts, spread gravel, or mix black-top as quickly and as smoothly as much larger machines, the American No. 8 motor grader can serve as an all-around road maintainer. Made by the American Road Equipment Co. of Omaha, Nebr., this machine can be fitted with a ½-yard hauling scraper, a scarifier, leaning front wheels, or a V-type snow plow, in addition to its standard 10-foot blade. It is 20 feet in overall length, and has a 16-foot wheelbase.

An effective weight pressure of 7,000 pounds is produced on the blade by large hydraulic hoists mounted directly over the circle. Made of ½-inch manganese steel, the blade has a lift of 12 inches, attained at the rate of 2 inches per second. Its angularity adjustment range is 120 degrees. All blade operations are controlled from the operator's seat. Blade sizes other than the standard 10-foot length are also available.

The American No. 8 is powered by either an International Model M gasoline engine, or by an MD diesel. It has five forward speeds, ranging from 2 to 16 mph, and one reverse, 3 mph. According to the manufacturer, its average fuel consumption is 20 gallons of gasoline or distillate for a heavy 10-hour day. The fuel tank has a 22-gallon capacity.

More complete details on the American No. 8 motor grader may be secured by writing to the manufacturer and mentioning this news report.

Commercial Credit Co. Opens 18 New Offices

Expanding its financing facilities throughout the nation, the Commercial Credit Co. has opened sixteen additional operating offices in fourteen states, and two in Canada. Three Vice Presidents of the finance firm have been appointed Regional Managers: E. A. Howell in Jacksonville, Fla.; Earl G. Miller in Indianapolis, Ind.; and J. H. Miller at St. Louis, Mo.

New eastern branches and their Managers include: Chester, Pa., W. K. Robinson; High Point, N. C., J. B. Lee; Daytona Beach, Fla., G. O. Snowden; Fayetteville, N. C., W. J. Vann; Trenton, N. J., R. T. Williams; Lewiston, Me., John E. McLeod. There are two offices in Indiana: Vincennes, with S. Laverne

Moines, Iowa, W. S. Pettit. Harold R. Timmell heads the branch at Billings, Mont., and Harold A. Hanson, that at Missoula. Don L. Smith is Manager at Boise, Idaho.

In Canada, the firm has established branches in Ontario, Alberta, and Saskatchewan. E. J. Brulotte heads the Quebec office; J. A. Searight, the one at Edmonton; and F. J. Neale, that in Saskatoon.

Single Gas Engine Powers Two Welders

One power source for two welding units has been used by the Hobart Bros. Co. to double the welding range of the conventional single-operator arc welder. The unit has been developed by placing two 300-ampere generators on a common shaft powered by an 8-cylinder Chrysler industrial gasoline engine.

With the new set-up, two operators can work independently of each other, since the engine is governed to maintain



A new Hobart model is a double unit powered by one gasoline engine and permitting two operators to work independently.

constant speed for all loads. It is possible by means of a paralleling switch, to turn the entire unit into a single-operator 600-ampere welder. This greater flexibility is especially helpful on construction and maintenance work where a wide variety of welding is experienced, Hobart says. The use of a single engine is said to produce a higher overall economy.

More complete details on the new two-operator gasoline engine-driven arc welder can be secured on mention of this report. Write Hobart Bros. Co. at Troy, Ohio.

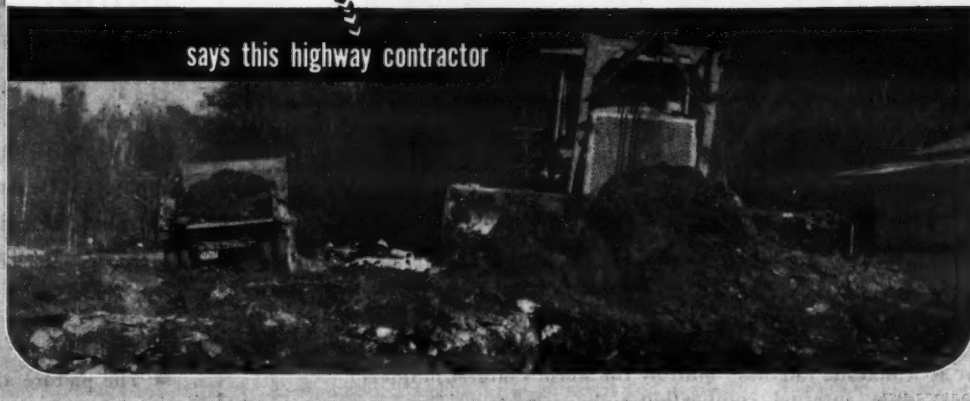
Elliott as Manager, and New Albany, under J. W. Kiesle.

Offices in the Mississippi Valley include Danville, Ill., John Frank; Monroe, La., George F. Kidwell; and Des



"Gulf Products and Fine Service are a big help on a tough job"

says this highway contractor



*Charles W. Riva, Inc., Boston, Mass., was recently awarded the contract for reconstruction of a 10-mile stretch of U. S. Highway No. 7, picturesque road through the Berkshires in Mass., which was severely damaged late last summer by a flash flood. Work includes relocation of the highway and several stream beds, elimination of bad curves and bridge reconstruction—all under tough service conditions. The contractor reports excellent performance from equipment with Gulf quality lubricants and fuels, in spite of mud and water, heat and cold.

"GULF QUALITY PRODUCTS and prompt delivery service have played a big part in our fast progress on this tough highway reconstruction job," says R. E. Crawford, Chief Engineer of Charles W. Riva, Inc.* "In spite of punishing operating conditions, our equipment has delivered top-notch performance day in and day out—and we haven't had a serious mechanical delay."

Like many other leading contractors, Charles W. Riva, Inc. has found that Gulf quality lubricants provide a higher degree of protection when equipment is pushed to the limit—and that Gulf fuels contribute to maximum power and efficiency. Result: fewer delays, better all-round equipment per-

formance, and a speedier, more profitable job!

Write, wire, or phone your nearest Gulf office and arrange to use Gulf quality lubricants and fuels on your next job. They are quickly available to you through 1200 warehouses located in 30 states from Maine to New Mexico.



Gulf Oil Corporation
Gulf Refining Company

Division Sales Offices:

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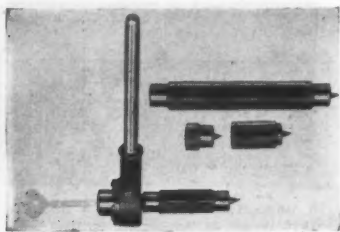
TRANSITS and LEVELS HEADQUARTERS for REPAIRS—any make

We will buy or trade in old Transits, Levels, Alidades, etc. Send instruments for valuation.

Write for new Catalog CE-25 of Engineering Instruments, Engineering Field Equipment and Drafting Room supplies.

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The new Liberty ratchet drill-driver is designed primarily for use on wood, but may also be used on metal.

Ratchet Drill Works In Restricted Spots

A new ratchet drill-driver for use between studs, joints, or other restricted spaces has been developed by the Liberty Tool & Machine Co. and is being marketed by Techtmann Industries. Intended primarily for use on wood members, the tool will also drill steel plates and beams.

Positive feed is given by the new unit with each turn of the bit. Any stand-

ard wood bit can be used, and, with an adapter chuck, any steel drill. A solid shaft carries the thrust of the lead screw directly to the drill shank. The ratchet drill-driver is made adaptable to a wide range of dimensions by combining a long lead screw with 1, 2, and 8-inch extensions. Holes can be centered within 1 1/4 inches of the nearest obstruction. Wearing surfaces hardened to a depth of 0.01 inch are said to withstand long hard service. The ratchet is fully enclosed in a strong semi-steel head, providing protection against dirt.

Further details can be secured from Techtmann Industries, 714 W. Wisconsin Ave., Milwaukee 1, Wis., on mention of this publication.

Airport Lighting Plans, Equipment in New Booklet

Engineers concerned with the designing, planning, building, or operating of airports will be interested in a new booklet just issued by Westinghouse Electric Corp. Its 56 pages present de-

tailed plans for airport-lighting projects, and illustrate the Westinghouse equipment designed for this work.

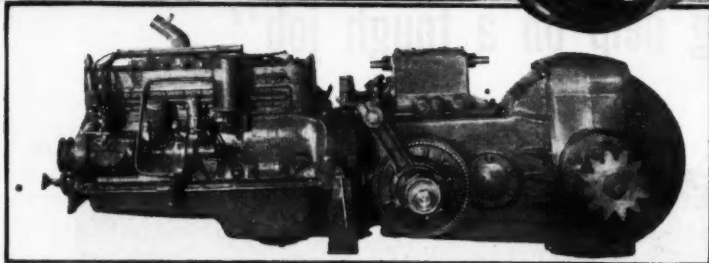
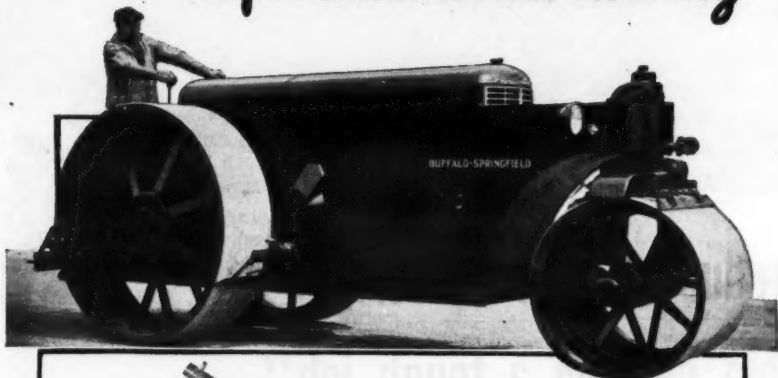
The plans depict typical lighting installations for airports in all classes. The layouts meet CAA recommendations, and cover lighting, wiring, and distribution equipment. Various selec-

tion data, typical specifications, and the description of the principal equipment for use within an airport's boundaries feature the booklet.

Copies of this booklet, "Airport Electrical Equipment", can be obtained by writing the Westinghouse Electric Corp., P. O. Box 868, Pittsburgh 30, Pa.

WAUKESHA POWER

Keeps road rollers rolling!



Waukesha-powered Buffalo-Springfield 10-12 ton, 3-wheel roller for compaction of sub-grade, embankments and foundation material. The huge roller's Model 6-MZR Waukesha Engine, 4-speed transmission, high-speed clutches, and final drive components are a solid one-piece assembly.

• Power plus speed—that's what Waukesha Engines put into Buffalo-Springfield rollers whether they're big 10-12 ton three-wheelers or trench rollers.

Made by The Buffalo-Springfield Roller Co., Springfield, Ohio—the largest exclusive producers of rollers in the world—they're known everywhere for smoother rolling.

Just as Waukesha Engines—built by the world's largest builders of heavy-duty internal combustion engines—are equally famous for smoother running.

Now every Waukesha is a war-work engine. For your future engine needs—to power shovels, cranes, hoists, pavers, mixers, graders, portable compressors, pumps, welders, rock crushers and screening plants, etc., consult Waukesha now. Get Bulletin 1079.

A Model FC Waukesha Engine powers this Buffalo-Springfield trench roller which is used for either trench rolling or road widening. Some states already require the use of this machine on all road widening projects.



WAUKESHA MOTOR COMPANY, WAUKESHA, WIS.
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WAUKESHA ENGINES

ELECTRICITY

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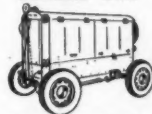


WHEN YOU WANT IT
WHERE YOU WANT IT

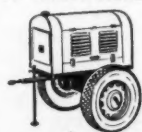
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Portable Unit



4-Wheel Trailer



2-Wheel Trailer

There's an economical "U.S." unit for every construction-work need. Engineered by men with practical, out-in-the-field experience. Built to take every punishment—and operate faithfully for long continuous hours. Sizes from 500 watts to 15 KW. Skids, rings, porter bars, and trailer mountings available.

"U.S." BUILDS A COMPLETE LINE of Gasoline and Diesel Electric Plants up to 75 KW—for standby, continuous duty, battery-charging, and portable uses. Write for literature, stating type of unit and capacity required.

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Factory representatives strategically located throughout U. S. A. and Canada.

"U.S." ELECTRIC PLANTS

"TIME
MARCHES
ON"...

but leaves little
evidence of wear
on this road built
of REILLY BITUVIA



• The picture at the top shows the road as it appeared three years ago when it was built to serve an important war plant. The lower picture shows the same road as it appeared in March, 1946. After three years of heavy war time traffic this BITUVIA road remains ready to give many more years of service.

This road is all-tar construction—with prime coat, base course and top surface of Reilly BITUVIA. Another example of the way in which BITUVIA has been keeping the roads up and the costs down—for nearly forty years.



Pocket-size manual containing
valuable road construction data,
will be sent on request.

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SEVENTEEN PLANTS TO SERVE YOU

New Parallel Road Built Making Dual Highway

Three Contracts Awarded To One Company; 10 Miles Of Grading and Concrete Pavement on Gravel Base

+ ANOTHER section of U. S. 40, main east-west artery of traffic across central Indiana, will have been made into a dual highway upon completion of the grading and laying of a new 22-foot concrete pavement on a 10.3-mile stretch from Dunreith, 38 miles east of Indianapolis, to Dublin, and of a future contract to provide a connecting transition pavement to the old road. The Indiana State Highway Commission divided this continuous 10.3-mile improvement into three contracts, but all were awarded to the Calumet Paving Co. of Indianapolis, Ind., on its low bids totaling \$768,034.35. Work started in September, 1944, and the paving was finished by the end of 1945, with some final work on shoulders and slopes to be concluded in the early part of 1946.

The new highway parallels at a 50-foot distance the original U. S. 40, which was built of concrete about 20 years ago with a width of 18 feet and a slab thickness of 7 inches. This original road has since been widened with a 9-inch concrete-base-course strip 2 feet wide on each side by a State Highway Maintenance Division contract, and most of the surface has also been topped with bituminous-coated aggregate binder with a rock-asphalt wearing surface to the full 22-foot width. In the future, this older part of the road will carry eastbound traffic, while the newly constructed pavement will serve for westbound travel. In the middle of the 50-foot grass parkway separating the two roadways is a drainage ditch.

A feature of the new construction is the 23-foot base course of Grade C special borrow, a sandy or gravelly material laid 5 inches thick at the center and 6 inches at the edge, on which the concrete pavement was laid. The new reinforced slabs are 7 inches thick at the center, increasing to 9 inches in 2 feet at the edges. The road is built across a flat plain, and parallels the main line of the Pennsylvania Railroad.

Three Contracts

The first of the three contracts started at Dunreith, 38 miles east of Indianapolis, and extended eastward to Lewisville, a distance of 3.9 miles, the contract price for its construction being \$283,375.66. From Lewisville, the second contract went 2.6 miles to Straughn at a cost of \$210,386.48, where the third contract, costing \$274,272.21, picked up and continued eastward to Dublin, a distance of 3.8 miles. The entire contract will ultimately function as a dual roadway, with the exception of a 160-foot section on the western end where a transition was made to two 28-foot roadways separated by a 2-foot concrete center curb, with shoulders 2 feet wide and 4 to 1 ditch slopes.

As the ground is flat and the material largely clay and sand, no great problems arose during the grading. Most of the material was moved by four Gar Wood 16-yard scrapers pulled by Caterpillar D8 tractors, two Caterpillar DW-10 10-yard wagons, and four 10-yard end-dump Euclids. The self-propelled rubber-tired equipment was loaded by a Lorain 70 crane with a 35-foot boom and a 3/4-yard dragline bucket. The average haul by the scrapers, which were aided in loading by an Allis-Chalmers Model L pusher tractor, was 1,200 feet, while the other earth-moving units made hauls from 2,000 to 3,000 feet. Two other Allis-Chalmers Model L tractor-dozers spread the ma-

terial in 9-inch layers, and 95 per cent compaction was obtained by two Buffalo-Springfield 10-ton 3-wheel rollers. Three Caterpillar No. 12 power graders gave the surface a final shaping. An average of 3,500 yards of material was moved in a 10-hour day.

In order to get the Grade C special borrow for the base course under the pavement and 6 inches beyond along each edge, three pits were opened where a sandy gravel could be obtained. This material met the following requirements:

Sieve Size	Per Cent Retained
2-inch	0-5
No. 4	0-65

The sandy gravel contained sufficient binding material to compact satisfactorily. The fraction passing the No. 200



C. & E. M. Photo
Anderson belt conveyors, 60 feet long x 24 inches wide, were used to unload aggregate from hopper-bottom cars on the Calumet Paving Co. 10.3-mile concrete paving project in Indiana.

sieve was not greater than one-half the fraction passing the No. 30 sieve, nor greater than one-fourth the fraction

retained on the No. 30 sieve. No material was rejected on account of the amount passing the No. 200 sieve, provided that amount did not exceed 10 per cent.

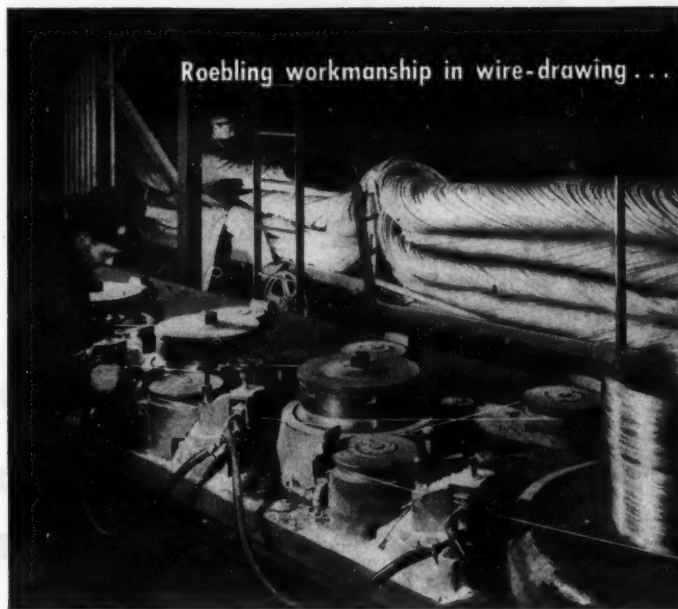
Two of the pits bordered the right-of-way while the third was about 600 feet in from the road; the average haul from each of the three pits was about a mile. A Killefer disk harrow was used to break up the ground surface at one of the pits, where a Caterpillar elevating grader loaded the Euclids which were also employed in hauling borrow. At the other two pits a Bucyrus-Erie 10-B dragline with a 3/4-yard bucket, and a Bucyrus-Erie 29-B dragline with a 1 1/4-yard bucket either loaded the earth-moving equipment directly or else made stockpiles of the gravel for later loading by a Haiss loader. Five Ford dump trucks, with a capacity of 3 1/2 yards each, hauled the base-course material to the road. Here it was compacted and graded by the same equipment used on the earth fills.

(Continued on next page)

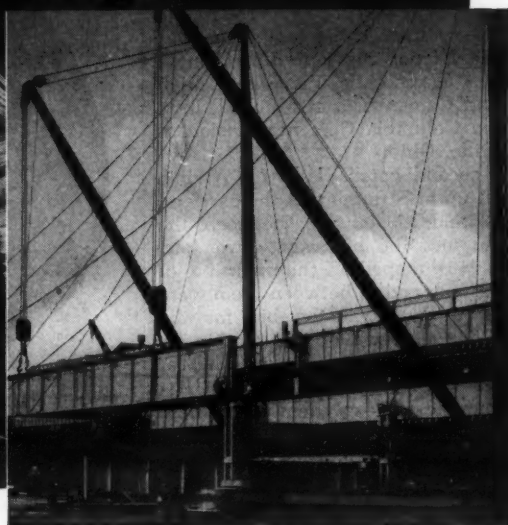
The right Wire Rope CAN HELP CUT CONSTRUCTION COSTS



Old Man Competition Is Getting Ready...
Roebling wire rope can help keep your costs down



Roebling workmanship in wire-drawing... means longer rope performance on the job!



TODAY, the construction business is returning to "normal" peacetime conditions. But it's far from the pre-war normal. Material costs are up. Labor costs are higher. Operating costs *must be held down*. One way to help hold them down is to specify Roebling "Blue Center" Steel Wire Rope.

Here's a *tough* rope that stands up under shocks, strains or high speeds. Specify it in the *right* con-

struction and you'll have long-life wire rope adding efficiency to your shovels, scrapers, hoists and draglines.

Whether your needs call for preformed or non-preformed wire rope, Roebling engineers can help you save... with sound advice on rope selection, installation and operation. Ask our nearest branch office about it.

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AND SHAPED WIRE • ELECTRICAL WIRES AND CABLES • WIRE CLOTH AND NETTING



ROEBLING

PACEMAKER IN WIRE PRODUCTS

New Parallel Road Built Making Dual Highway

(Continued from preceding page)

Batch Plants

Two separate batch plants were set up for this project: one for the paving, and the other to supply concrete for the fifteen culverts ranging in size from 3 x 2 to 14 x 8 feet. This concrete was carried in two Rex 2-yard Moto-Mixers mounted on Ford trucks. The batch plant for the ready-mixed concrete was set up at Lewisville, just across the Pennsylvania Railroad tracks along a siding built on an embankment. By means of chutes 15 feet long, sand and gravel were unloaded from hopper-bottom cars parked on this embankment. From the stockpiles thus formed, a Koehring crane, with a 35-foot boom and a 1/2-yard Blaw-Knox clamshell bucket, loaded the material into a Blaw-Knox bin under which the trucks backed for loading.

The trucks received their water quota by gravity from a 500-gallon tank which was mounted at the side of the railroad embankment and filled by a 2-inch iron pipe from the Lewisville water supply. Bag cement was unloaded from freight cars directly onto a wooden platform, and emptied through an elephant-trunk connection into the truck-mixers as they passed beneath.

Gravel and sand were delivered to both plants via the Pennsylvania railroad from the American Aggregates Corp. at Richmond, Ind., which is 30 miles from Lewisville. Air-entraining cement was used in the paving and was purchased from the Lone Star Cement Corp. at Greencastle, Ind.; the Lehigh Portland Cement Co. at Mitchell, Ind.; and the Columbia Cement Division at Zanesville, Ohio.

The second batch plant, for paving, was set up at Straughn, at the east end of the middle contract, between the railroad and the highway. Two spur tracks were tapped off the main line of the railroad, and in between them were erected a Butler 40-ton bin for the gravel and a Blaw-Knox 20-ton bin for the sand. To unload the two kinds of gravel and the sand from hopper-bottom cars parked on the siding, three Anderson conveyor belts were rigged up, 100 feet apart, with one end in pits beneath one of the spur tracks, and the other end supported 10 to 12 feet above the ground by two poles, 10 feet apart, and connected by a cross brace. The conveyors, 60 feet long x 24 inches wide, were driven by electric motors supported on a platform built on each set of poles, the power coming from a nearby electric line through a step-down transformer. A Caterpillar RD8 tractor with a long cable was used to shift the cars about on the siding.

The aggregate bins were loaded from the stockpiles formed at the ends of the conveyor belts by a Lorain 70 crane with a 35-foot boom and a 1 1/4-yard clamshell bucket. On the other spur track, bulk cement was unloaded into a 300-barrel cement-storage bin, and batch trucks were filled by driving under and through both aggregate and cement bins. Water for the mix was secured from the Lewisville water works and trucked to the paver in two 1,000-gallon tanks mounted on Ford trucks. The gradation of the aggregate met the following specifications:

Sieve Size	Per Cent Retained	
	No. 2 Gravel	No. 5 Gravel
2 1/4-inch	0	.....
2-inch	0-5	.....
1 1/2-inch	.....	0
1-inch	80-100	2-15
3/4-inch	95-100	15-40
3/8-inch	98-100	40-70
No. 4	.....	90-100
No. 8	.....	96-100
No. 30	.....	50-80
No. 50	.....	80-95
No. 100	.....	95-100

From 35 to 40 per cent of the batch

was sand, while the gravel was divided into 40 per cent of No. 2 gravel and 60 per cent of No. 5 gravel. The cement ratio was 1 1/2 barrels for every cubic yard of concrete.

Concrete Pavement

On August 6, concrete operations began on the full 22-foot width of pavement, with a Koehring Twinbatch 34-E dual-drum paver working outside the Blaw-Knox forms, of which there were 3,000 feet on the job. The batches were mixed a total of 1 minute and then deposited from a dual-gate bucket on a 35-foot boom. A Blaw-Knox spreader struck off the concrete 2 inches from the top of the slab, after which the puddlers inserted the reinforcing tie bars across the center of the slab to a depth of 3 1/2 inches from the top of the pavement. The 3/8-inch round deformed bars are 4 feet long and were set across the center line at a 5-foot spacing. The wire-mesh reinforcing was then laid 2 inches from the top of the slab, after which the

(Concluded on next page)

NOW AVAILABLE FOR IMMEDIATE DELIVERY

ALL SIZES AND MODELS

VIBER HIGH-SPEED VIBRATORS

PHONE YOUR DEALER TODAY

In the field for years, VIBER internal concrete vibrators have been delivering constant satisfactory service under all job conditions. VIBERS speed up the job, providing the highest vibration speed in concrete—over 9500 RPM!—at 110 Volts. Easy to work with, portable, rugged—no wonder VIBER gets the call! VIBER'S simplified design with complete interchangeability of parts including power units (electric, pneumatic or gasoline) further eliminates costly delays and lowers costs. So specify VIBER-ation (not ordinary vibration) and put VIBERS on the job.

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ORIGINATORS OF INTERNAL CONCRETE VIBRATION



FASTER... Easier job-to-job travel ...with the ADNUN Carryall

ADNUN leads again! Now between-jobs travel is a much simpler, faster operation than ever before with the Adnun Carryall. Two pneumatic, rubber-tired wheels on heavy, retractable frames lift the rear rolls clear of the ground—ready for fast towing or self-propelled travel with the powerful Adnun front-wheel drive. On the job, Adnun Carryall wheels lock up and out of the way of paving operations. Either putting the wheels down for travel or up for work is a quick, easy job. . . . Done on the spot without jacks or other special tools. Where long strips of cold material are being laid, and job conditions prevent paving in both directions, the Adnun Carryall can save hours per job in getting back—fast—to start a new strip. Adnun Carryalls can be quickly attached to your present Adnun Black Top Pavers, or furnished already installed on new machines. Give serial numbers of your Adnuns when ordering.

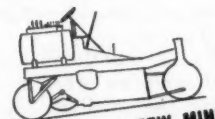
THE FOOTE COMPANY, INC.
1916 State Street
Hunda, New York



UP AND OUT OF THE WAY ON THE JOB
In retracted position, the Adnun Carryall gives plenty of clearance and is well out of the way during black top paving operations.



EASY TO PUT DOWN FOR TRAVELING
Just back the rolls of your Adnun onto a block, drop the Carryall wheels and insert the lock pin. . . . You're ready to travel! And no trailers or ramps are necessary.



READY TO GO IN A FEW MINUTES
There's nothing complicated about using the Adnun Carryall. . . . Only a few minutes required to put your Adnun on the job, or get it set for fast towing or self-propelled travel.

ADNUN

TRADE MARK REGISTERED

BLACK TOP PAVER

New Parallel Road Built Making Dual Highway

(Continued from preceding page)

spreader evened off succeeding batches of concrete to the top of the forms.

The 9-7-9-inch concrete pavement has a 1¼-inch crown and a contraction joint every 40 feet, but it has no expansion joints. The dowel-bar holders were made by the Highway Steel Products Co., and at each joint two of them were set on the subgrade 2 feet apart. On the bottom of the holders were metal strips, 1¼ inches wide, with 5/16-inch holes at each end through which were driven 6-inch spikes to hold the joints firmly in place on the ground. Dowels, ¾ inch x 2 feet long, on 1-foot centers were framed in the joint at a 3½-inch level above the bottom of the pavement. They were painted and greased but not capped.

After the spreader came a Jaeger-Lakewood finisher which was followed by a Flex-Plane machine inserting an asphaltic ribbon 3 inches deep and ½ inch wide down the center of the pavement. Next came a Koehring Longitudinal Finisher. The only vibrating that was done was around the joints. Working from a bridge, the finishers inserted a steel strip to mark out the contraction joint; this strip was later removed before the concrete had acquired a set, and the open joint was poured with bituminous filler. A light fiber broom was pulled over the concrete, and the contraction joints were edged with a ¼-inch-radius tool, while the outside edges were finished with a ¾-inch tool. The final touch was a 6-inch black-oxide strip down the center to outline the lanes more clearly. Cem-Cure, a membrane compound, was used for curing the concrete.

Major Items

The major items in the three contracts from west to east along the highway were:

Dunreith to Lewisville 3.9 miles, \$283,375.66	
Excavation	110,789 cu. yds.
Special borrow for subgrade	11,336 cu. yds.
Reinforced-concrete pavement	33,980 sq. yds.
Reinforcing steel for pavement	1,988 lbs.
Concrete for structures	256 cu. yds.
Reinforcing steel for structures	33,641 lbs.
Drainage pipe, 6 to 30-inch	5,712 lin. ft.
Lewisville to Straughn 2.6 miles, \$210,386.48	
Excavation	79,476 cu. yds.
Special borrow for subgrade	7,180 cu. yds.
Reinforced-concrete pavement	34,305 sq. yds.
Reinforcing steel for pavement	1,147 lbs.
Concrete for structures	497 cu. yds.
Reinforcing steel for structures	53,135 lbs.
Drainage pipe, 6 to 30-inch	5,896 lin. ft.
Straughn to Dublin 3.8 miles, \$274,272.21	
Excavation	86,289 cu. yds.
Special borrow for subgrade	10,468 cu. yds.
Reinforced-concrete pavement	49,848 sq. yds.
Reinforcing steel for pavement	1,487 lbs.
Concrete for structures	321 cu. yds.
Reinforcing steel for structures	40,483 lbs.
Drainage pipe, 6 to 30-inch	10,109 lin. ft.

With the completion of this 10.3-mile construction job and a future contract providing the connecting transitions, U. S. 40 will have a continuous four-lane pavement (with the exception of a very short stretch of three-lane road)

from Indianapolis to Richmond, a distance of 68 miles. The 6-mile stretch from Richmond to the Ohio state line will soon have another 22-foot pavement added to it, making a dual highway like the road to the west of it. From Indianapolis westward to Terre Haute, the highway is either three or four lanes wide, and the 7 miles from Terre Haute to the Illinois line is slated to be made into a dual highway. Thus Indiana will be traversed from east to west almost entirely by a four-lane highway, with the exception of some short stretches of three-lane road.

Not included in the contracts of the Calumet Paving Co. but a part of the improvement on this same highway was the construction of two bridges. One of these is a reinforced-concrete arch over Flat Rock Creek at Lewisville, built by Deniston & Garber of Rochester, Ind., for \$62,988. The other is a similar type of structure over Buck Creek east of Dunreith, constructed for \$40,960 by John R. Gates of Fort Wayne, Ind.

The dual-highway construction was under the direction of the Construction Division of the Indiana State Highway Commission, of which Carl E. Vogelgesang is Chief Engineer and J. T. Hallett is Engineer of Roads, and was located in the Greenfield District, of which C. V. Windsor is District Engineer. Warren Pigg was Project Engineer for the Highway Commission on one of the contracts, and G. W. Jackson was Project Engineer on the other two contracts. Abe Verplanck was Superintendent for the contractor, the Calumet Paving Co.

Heads New Solvay Branch

Col. S. O. Taylor has been chosen Manager of the Solvay Sales Corp.'s newly established office in the M&M Building, Houston, Texas. The office will supply Texas, New Mexico, and Arizona with alkalies, calcium chloride, and other chemicals produced by the Solvay Process Co. Col. Taylor, a veteran of both wars, was with the St.



"I'll put your name in lights—"

Louis Solvay office eleven years. He had been Executive Officer at Patterson Field, Dayton, Ohio, for the past three years.

ATKINS

"SILVER STEEL" BLADES

New Life

for your power saws....

Above is Atkins No. 37 Mitre Tooth Saw, a combination rip, crosscut and mitre saw that is very popular with users of portable machines. Below are shown two of the many other tooth styles available.

Rip tooth for smooth, high speed ripping.

Crosscut tooth for fast, easy crosscutting.

NOTE: While Atkins does not manufacture these portable machines, the company does furnish blades to many of the leading machine manufacturers.

• Getting peak production from every tool is just good sense in the busy days ahead. To get the most out of your portable power saws, do as so many contractors are doing—equip them with Atkins "Silver Steel" Blades. No matter what the job—rip, crosscut, mitre—there's an Atkins Blade to cut it faster, to cut straighter, to cut cleaner, and to keep cooler, even in the gummiest wood. Made of famous Atkins "Silver Steel," these saws are tough... built to stand up under rough and tumble job conditions... with teeth that stay keen and reduce time lost in changing blades. Let Atkins Blades speed up your job. Write for full information today.

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"I've used Fords since 1931—that's many years of satisfied service. I feel I've been lucky in having a Ford through these years."

Emergency pressures, which have been on the building trades, have made over-

loading almost a national custom. No truck engineer likes to see overloading, of course. But it has certainly proved one big fact for thousands of Ford Truck operators: Ford Truck endurance is a tremendous asset when the going gets really tough. Then Ford axle and clutch engineering prove their soundness; Ford frame strength and spring capacity prove their extra value; and Ford power speeds jobs to a finish.

There's a new Ford dump truck chassis in production now. Heard about it? Ask your Ford Dealer.

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THE FAMOUS V-8 ENGINE, for toughest service, now 100 HP, with NEW steel-cored Silvaloy rod bearings for trebled endurance • NEW Flightlight aluminum alloy 4-ring pistons for added oil economy • Tougher, rust-proofed valve springs • NEW moisture-sealed distributor • NEW coolant-saving radiator closure • Auto-balanced carburetion for still more thrifty power • Servicing simplified still further. And the rugged, thrifty 90 HP Ford six-cylinder engine, for stop-and-go jobs, with many important advancements, available in all except C.O.E. chassis.

Ford Truck rear axles—world-famous for load-lugging—provide generous reserve capacity • Light duty chassis have sturdy ¾-floating axle with triple-roller-bearing, straddle-mounted pinion; full-floating axles in all other chassis • 2-speed axle at extra cost in heavy duty units • Improved 4-speed transmission at extra cost in light duty chassis, standard in all others.

Reinforced-Concrete Channel To Tame Turbulent Streams

Flood-Control Program Includes 15,000 Feet of 40-Foot-Wide Channel; Steel Pile and Rock Outlet

A highly important part of the flood-control scheme for Lytle and Cajon Creeks in the San Bernardino County, Calif., Flood Control District (See C.E.M., April, 1946, pg. 2) was the \$2,528,320 contract let by the U. S. Engineers to the contracting firm of Bressi-Bevanda-Macco Co., composed of the Bressi-Bevanda Co. of Los Angeles and the Macco Construction Co. of Clearwater, Calif., operating jointly. This second and lower phase of the work consisted of some 15,000 linear feet of reinforced-concrete walled channel capable of carrying 30,000 cubic feet of water per second; the construction of intake and outlet structures; four railroad-shoo-fly embankments; steel sheet piling; the erection of railroad and highway bridges across the new channel; and the relocation of existing utilities.

Below Foothill Boulevard, Lytle Creek winds through a residential and industrial section, well built up over the years. Previous experience by the Los Angeles Office of the Army Engineers has pointed up the desirability of confining flood run-off in suitable man-made concrete channels of this type, particularly where the water must pass through this kind of territory. It has been successful from the standpoint of cost, where the purchase of right-of-way was involved; also concrete channels can be more accurately designed to carry a predicted flow.

The gradient of the new channel is approximately 1 per cent. Water flowing over a grade this steep will accelerate to a speed of 25 miles per hour, carrying sand and small boulders along the invert slab. Due to the destructive scouring forces expected here, the new channel has a special concrete design in the top 5 inches of its invert slab. This concrete is especially dense, with a low water-cement ratio and high strength. Details on this mix follow later.

The most important factor on this project was time, and that was the hardest problem for the contractor to meet successfully. When the job started, on June 16, 1945, Bressi-Bevanda-Macco faced a nearly-impossible schedule, the completion of 15,000 feet of usable concrete channel by December 15. The magnitude of this work can perhaps be appreciated more completely by visualizing its concrete. The new channel has two walls from 20 to 25 feet in height, is 40 feet wide inside, and has floor slabs ranging from 14 to 40 inches in thickness. It was designed on the basis of two L-type walls.

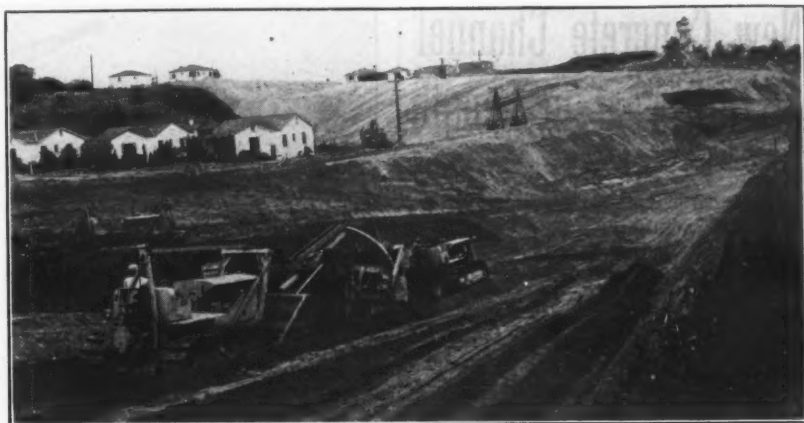
The new channel was built along the old west branch of Lytle Creek 7,000 feet downstream from Foothill Boulevard to the Atchison, Topeka & Santa Fe Railroad crossing. A new course was excavated below that point, emptying the water into Warm Creek about a mile upstream from its confluence with the Santa Ana River. It was vital that concrete work closely follow the excavation in order to meet the tight time schedule.

Channel Excavation

Excavation for the channel was done by tractor equipment, and the material was stockpiled for use as backfill along the L-type walls. Eleven Caterpillar

D8 tractors, each towing a LeTourneau 15 to 25-cubic-yard Carryall, were used. Four D8's were equipped with pushing blocks, and four others were used with bulldozers. Six Super C LeTourneau Tournapulls and six 18-cubic-yard bottom-dump Euclids were also used. The Euclids were loaded by dragline and used on long hauls. One such haul, through the city of Colton, Calif., was a mile long. For the most part, however, the distance from excavation to stockpile was kept down to 500 feet, especially for the tractor equipment.

The material was channel-run sand



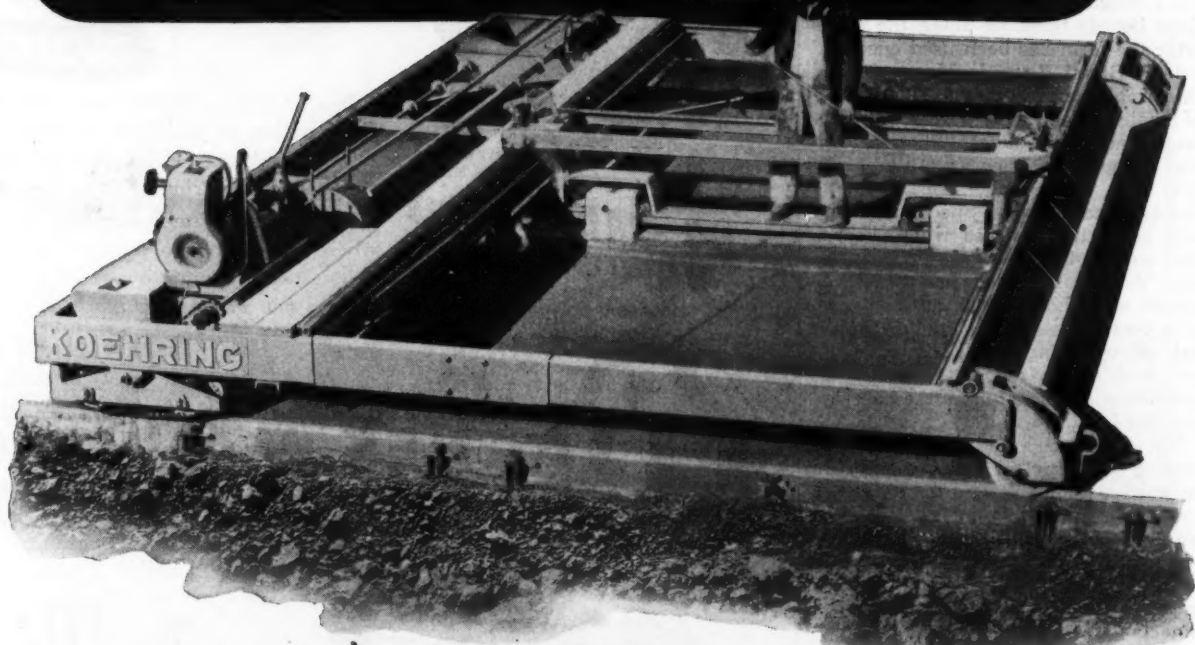
For most of the excavation on its contract for a 15,000-foot reinforced-concrete channel Bressi-Bevanda-Macco used a fleet of 15 to 25-yard LeTourneau Carryalls pulled by Caterpillar D8's.

and gravel, with some boulders up to 12 inches in diameter. Normally this material would not load a scraper to capacity unless the tractor was tremendously over-powered in relation to

the size of its companion hauling unit. The use of pushers offset that difficulty here, and brought even the 25-yard Carryalls out of the pit loaded to capacity.

(Continued on next page)

IS OBSOLETE HAND BULL FLOATING HOLDING BACK YOUR PAVER?



KOEHRING LONGITUDINAL FINISHER KEEPS UP WITH ANY PAVER PACE

Can you afford to hold back your paver simply because the hand finishing crew can't keep up? When, with a Koehring Longitudinal Finisher on the job, you might be laying all the concrete your paver can produce? Yes, the Koehring Longitudinal Finisher keeps right up with any paver — and offers other important advantages as well.

FINISHES WHEN SURFACE IS READY

Only the Koehring Longitudinal Finisher can finish some surfaces at the exact time when finishing should occur—after

the surplus water has risen to the surface, when the concrete will no longer bleed after it has received its final finish. Hand bull floating often cannot touch harsh concrete at this stage.

EXACT COMPLIANCE WITH SPECIFICATIONS

Surfaces finished by the Koehring Longitudinal Finisher are smoother riding, wear better, because crowns are finished exactly as specified. Savings on finishing labor costs often run high.

KOEHRING COMPANY • Milwaukee 10, Wisconsin

HEAVY-DUTY CONSTRUCTION EQUIPMENT



New Concrete Channel 15,000 Feet in Length

(Continued from preceding page)

ity. Excavation plans called for a 1 to 1 side slope behind the proposed concrete walls, and when this slope was out it stood up well. A total of 1,215,000 cubic yards of channel excavation, plus 12,000 cubic yards of structure excavation, was handled in this manner for a contract price of \$0.30 and \$3.00 respectively.

Concrete Formwork

Channel wall forms, 25 feet in length x 22 feet high, were built sturdily, so they could be used over and over. The form was outlined by 6 x 6-inch timbers, cross-braced with 6 x 6 x 3/4-inch angle iron. Six bolt bales, spaced equidistantly on each vertical timber, allowed the forms to be joined together so more than one wall slab could be poured at one set-up. The facing of these forms was made up of two layers, the back layer being 2-inch-thick lumber and the outer layer of 1 x 4-inch tongue-and-groove flooring. The inner layer was placed on a 45-degree angle from the 6 x 6's, and the outer or surface layer of boards was nailed horizontally. Two lifting eyes were placed in the 6-inch timber at the top of each form so the forms could be set and removed easily by a crane.

Any concrete-placing foreman is all too familiar with the old headache of form boards buckling along the edges after the form has been used once and dried. Bressi-Bevanda-Macco solved this problem neatly by enlisting the aid of a pair of electrically powered Craftsman sanding machines. When a form was stripped, two men gave it a going-over with these sanders, using coarse sheets of emery paper. Special attention was given those places where boards had started to buckle, and the entire form face was sanded smooth. It required only about 20 minutes per form, at a cost of less than a dollar, but it paid off by giving a well aligned channel wall which did not have to be patched and dressed after the concrete had hardened.

The forms were sprayed with a light coating of form oil after they were stripped and sanded, and then just before the crane set them in place they were given another treatment. Oiling of forms after they were set in place, with steel inside them, was not permitted. One of these forms lasted for nine pours, but according to the concrete foreman six set-ups were the rule with careful use. The panels were built in the contractor's yard and hauled by truck down to the channel. As many forms as possible were built in this manner, away from the site of work, to relieve congestion. It was a crowded job, employing some 850 men.

Concrete Placing

It has been common practice in pouring concrete channels of this type in California and other parts of the west to proceed at a somewhat leisurely pace, pouring alternate monoliths and filling up the spaces after the previous pours had cured. Excavation was always far out ahead, and the contractors were never pressed for working space. This was definitely not so at Lytle Creek. So rapidly did concrete pouring progress behind excavation that alternate pours prevented the contractor from using his well organized concrete crews to the limit of their potential capacity.

Under the direction of Roscoe P. Downs, Project Manager for Bressi-Bevanda-Macco, a pre-molded expansion joint was designed to be poured in place at the end of each invert monolith. Adjacent pours of massive invert slabs from 42 to 63 inches in thickness



A specially built concrete conveyor used with a Gar-Bro hopper and elephant trunk delivered truck-mixed concrete to the invert slab of the reinforced-concrete channel on the Bressi-Bevanda-Macco section of the San Bernardino flood-control project.

were then successfully made. The pre-molded joint was made up in this man-

ner:

A sheet of 14-gage sheet steel was

burned off to correspond with the neat-line cross section of the end of the invert slab, and enough common wire nails were spot-welded head down to hold the asphalt-impregnated fiber expansion-joint material. The sheets, 1/4 inch thick, were fastened to these nails and the entire section picked up by a Koehring crane and set in place.

The premolded joint was secured from movement during the pouring of concrete by placing a piece of 4 x 4 x 1/2-inch angle iron horizontally across each side at the top of the sheet iron. The flat web of the angle iron had round holes burned at intervals of 4 feet. Then 1 1/4-inch round steel stakes with a 3-inch cleat on the top were driven down with 16-pound sledgehammers on both sides of the joint material. When the concrete was placed, it was poured on both sides of this premolded joint simultaneously, and the combination of angle iron and steel pins was sufficiently strong that no buckling occurred.

It must be borne in mind that the (Continued on next page)

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Where intermittent pumping of large volumes of liquids is required—where the utmost in portability is desired—where a rugged, tough, and able-to-take-it pump is needed—these new Barnes "33,000 for 1" Pumps are the best buy on the market.

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Quality Pump Manufacturers for 50 Years MANSFIELD, OHIO



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Experienced contractors have long known ARMCO Corrugated Metal Pipe as a reliable aid to bigger job profits. Today the time- and labor-saving features of this durable pipe are more important than ever, and this is why...

Savings start the minute you begin to transport ARMCO Pipe to the job site. Although amply strong, it is light in weight for easy handling, loading and hauling. Fewer trips and less labor are needed. On the job a small, unskilled crew installs it quickly without cradling, and backfilling can be done immediately. No curing and no delays to other operations. The entire job is speeded up and profits go up accordingly.

Let ARMCO Corrugated Pipe help you keep under the budget on that next contract. Use it for culverts, conduits, sewers, and wherever else drainage is needed. There is a

type for every condition. Write for complete data. Armco Drainage & Metal Products, Inc., and Associated Companies, 2245 Curtis Street, Middletown, Ohio.



ARMCO CORRUGATED PIPE



C. & E. M. Photo
These steel forms were used at the end of invert pours.

New Concrete Channel 15,000 Feet in Length

(Continued from preceding page)

day's pouring layout might include as many as ten or twelve invert slabs, but each end of the day's pour was secured by extraordinarily strong formwork. The upper end of the day's pour ordinarily was placed against solid concrete, stripped of its forms. The lower end was held from movement by $\frac{3}{8}$ -inch sheet steel forms, which were set in place by a crane and braced with 6 x 6-inch timbers. These steel forms were stripped after the concrete set up, and were used again and again. A screed line was set on the steel forms after they were in place. In the case of the premolded joints, they were of course set to grade and carefully checked for elevation before the pour commenced.

It was also necessary to develop another contrivance, a concrete conveyor, to speed up the handling of concrete. Due to the incorporation of Class A concrete and the special topping mix in the invert slabs, this conveyor was also especially desirable because it afforded more accurate placing control than conventional dumping buckets could give.

The power-driven conveyor was built in the Macco Construction Co. yard. A 65-foot belt conveyor with a 24-inch Goodyear belt driven by a Novo gasoline engine was braced with angle iron and hinged 20 feet from the end. The rear 20 feet was set on steel cleats welded to the bottom of the cab of the concrete-placing crane, and the forward end picked up on the load line. Elevation of the end of the conveyor was controlled by the crane operator by hoisting or paying off the load line. Horizontal travel up and down the channel was controlled by crawling the machine. Three such conveyors were used. Two Northwest 80-D machines and a Koehring Model 801 were used in concrete-placing work.

In pouring the concrete, the cranes were placed on top of the bank above the channel. A fleet of 4-cubic-yard truck-mixers, which hauled the concrete from the central batching plants

of Consolidated Rock Products Co. and from Triangle Rock & Gravel Co., dumped direct onto the conveyor. Hanging on the outboard end of the conveyor frame was a Gar-Bro hopper and elephant trunk, which carried the concrete down to the invert slab. This contrivance permitted truck-mixers to discharge continuously, and was one of the big reasons why Bressi-Bevanda-Macco was able to keep three separate concrete organizations pouring at top speed. It made possible the use of high-cost labor and machines with near-100-per-cent efficiency.

Conventional dump buckets were used in pouring the comparatively thin walls. The same truck-mixers which carried invert concrete were used here, but instead of discharging on the conveyor belt they dumped their loads, 2 cubic yards at a time, into a Gar-Bro bottom-dump concrete bucket, carried on the load line of a Koehring Model 801 crane. The bucket was further controlled by hooking the Koehring drag drum cable to the concrete bucket bail.



C. & E. M. Photo
The 15,000 feet of completed reinforced-concrete channel in the Bressi-Bevanda-Macco contract is 20 to 25 feet deep and 40 feet wide, with floor slabs from 14 to 40 inches thick.

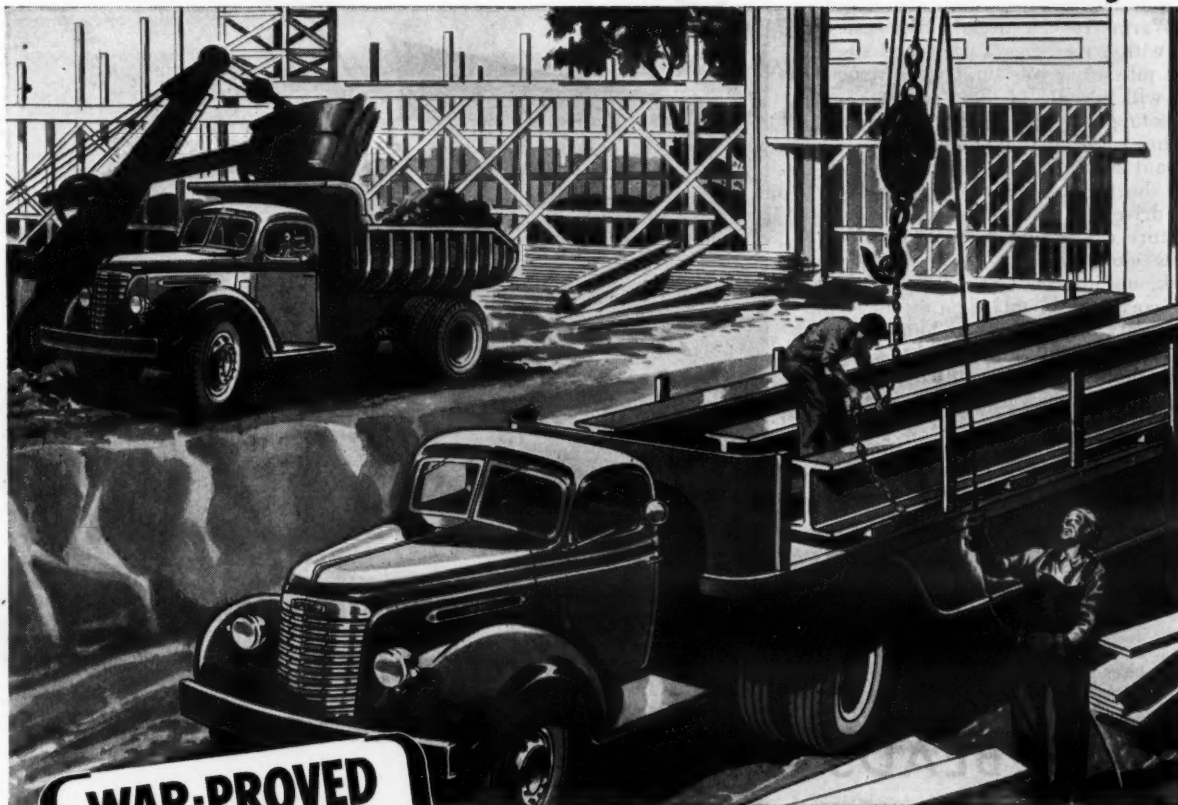
The machine swung the filled concrete

bucket out over the wall forms, where four equally-spaced hoppers with elephant trunks carried the mix down into the reinforcing steel inside the forms.

Electric vibrators were used after each bucket was dumped. The mix was vibrated to the point where air bubbles began working up through the surface. These contractors, who number among other achievements the construction of Sepulveda and Bartlett Dams, have found from long experience in concrete work that an excellent face can be produced against wood forms in this manner. Excessive vibration causes air and vacuum pockets. Vibration too close to the form often damages the wood, which of course spoils the concrete surface as well. For these reasons, the vibrators were kept down inside the reinforcing steel, from 4 to 5 inches away from the forms.

Included in this part of the work was a contract for cutting, bending, and delivering 11,340,000 pounds of reinforcement. (Continued on next page)

NEW GMCs for Heaviest Hauling



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and IMPROVED
FOR 1946**

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• Rugged, built-for-the-job chassis with extra strong Frames, Springs and Axles, heavy duty Transmissions and Clutches, Needle Bearing Universal Joints, Recirculating Ball-Bearing Steering and powerful, easy-action Brakes.

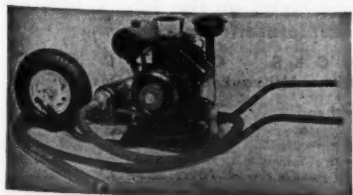
• Rider Ease Cabs with Cradle-Coil Cushions, Wide Visibility "V" Windshields, Quick-vision Instrument Panels, All-Weather Insulation and Controlled Ventilation.

New GMCs offer you the most in heavy duty truck value in a most complete selection of models. There are tractor units, dump models, four-wheelers and six-wheelers in tonnage ranges to fit every requirement . . . and with equipment options which include worm, double reduction and dual drive axles, 5-speed underdrive and overdrive transmissions, gasoline and diesel engines, heavy duty clutches and air brakes. It will pay you to investigate GMC. For, whatever you haul . . . sand and gravel, cement, ore, steelwork, heavy construction equipment and many more . . . you'll find a war-proved, improved GMC truck ideally suited to the job.

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Write for information and prices

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GMC TRUCK & COACH DIVISION • GENERAL MOTORS CORPORATION

New Concrete Channel 15,000 Feet in Length

(Continued from preceding page)

ing steel. It was let jointly to the Blue Diamond Corp., Ceco Steel Products Corp. and the Soule Steel Co., all of Los Angeles. The prime contractor was held responsible, under the terms of the contract, for the coordination of steel deliveries, and the inspection of steel was handled through the Operations and Supply Divisions of the U. S. Engineers.

Several concrete mixes were used on this project, as follows:

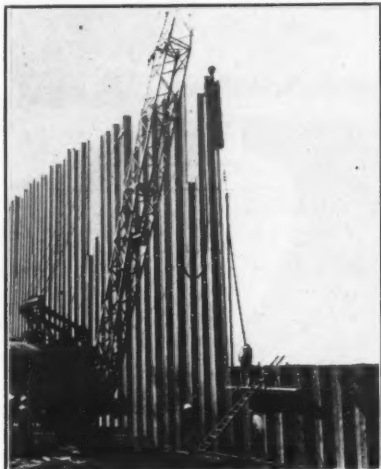
INVERT BASE AND WALLS	
W/C ratio: 6.5 gallons per sack	
1½-inch maximum-size rock	
1-sack batch as follows:	
Cement	94 lbs.
Sand	250 lbs.
¾-inch rock	180 lbs.
1½-inch rock	210 lbs.
Yield: 5.19 sacks cement per cubic yard	
INVERT TOPPING	
W/C ratio: 5.0 gallons per sack	
1½-inch maximum size rock	
1-sack batch as follows:	
Cement	94 lbs.
Sand	160 lbs.
¾-inch rock	130 lbs.
1½-inch rock	200 lbs.
Yield: 6.60 sacks per cubic yard	
BRIDGE STRUCTURES	
W/C ratio: 6.5 gallons per sack	
¾-inch maximum size rock	
1-sack batch as follows:	
Cement	94 lbs.
Sand	240 lbs.
¾-inch rock	300 lbs.
Yield: 5.87 sacks cement per cubic yard	

Outlet Structure

At the lower end of the job, where the new channel will drop the water into Warm Creek, a special outlet structure with a rock-faced levee and steel sheet pile groin was built. This structure will permit the flow to fan out, dissipating the destructive forces of eddying water at this point.

About 24,000 square feet of MZ-type steel sheeting in sections 60 feet long was driven to form the groin. This structure was designed on a 1,000-foot radius along the left bank of Warm Creek, and in order to set the pile sections correctly on this type of curving alignment, the contractor built up a timber pile-setting guide.

This timber guide permitted the setting of ten sections of piles at one spotting of the form. The base of the guide was built of 12 x 12's, with an upright and two line channels of the same-size timbers. It was braced by 4 x 12-inch



C. & E. M. Photo

Approximately 24,000 square feet of 60-foot steel sheet piling was driven by a McKiernan-Terry 10B2 pile hammer.

timbers bolted through the 12 x 12's. It was set in place by a Northwest 80-D crane and the free end of the timber

channel was bolted to the pile sections already set. Correct alignment for each battery of ten piles was provided by survey hubs spaced on .25-foot centers. It was estimated that the theoretical error off the radius in placing ten piles at one set-up in this manner would be only ½ inch, which was considered sufficiently accurate for all practical purposes.

Each group of ten piles was driven to 10 or 15-foot penetration, using the pile-driving crane and a McKiernan-Terry 10B2 steam-driven pile hammer, before the timber guide was removed. By the time the MZ sections reached that penetration they were so tight that each blow of the pile hammer produced only 0.1-inch penetration per blow.

In order to secure the remainder of penetration, about 35 feet, the contractor used a 4-inch water jet in conjunction with the pile hammer. The 60-foot pipe was suspended by wire rope and hoisted and lowered from the drag drum of the Northwest 80-D driving crane. Through this jet pipe 200 psi

was maintained by means of two Byron-Jackson 15-inch two-stage centrifugal pumps, each with a 6-inch intake and a 2½-inch outlet. These pumps were mounted on a platform on either side of a Murphy diesel engine, which had two driving pulleys mounted on its drive shaft. Each pump was driven by a five-belt V-belt hook-up. The pumps were designed to produce as much as 500 pounds per square inch on the line, but the loss of pressure in 800 feet of water line between pump and pile driver, coupled with constant use of this unit the past year, reduced that somewhat. It was found that as long as 200 psi was maintained, pile penetration definitely improved.

The difference between jetting and straight driving in this alluvial river bottom was the difference between 0.1 foot per blow with jet, and 0.1 inch per blow without it.

The McKiernan-Terry 10B2 pile hammer was activated by steam furnished by an 80-hp horizontal locomotive.

(Concluded on next page)

HOT OIL FAST!
..with Less
FUEL..WATER..WORK



**Handle that road oiling contract
more profitably with a
Cleaver-Brooks Tank Car Heater**



The quicker you get the oil or asphalt in the tank car on the siding up to application temperature and flowing into the distributors—the faster your road crews can get going and finish the job.

With a Cleaver-Brooks Tank Car Heater you can have hot, dry steam flowing to car coils from a cold start in 20 minutes or less. And you can keep going all day with the least work and bother because a Cleaver-Brooks Tank Car Heater requires less fuel and water.

Perfect—highly efficient—you can tow it with car or truck to tank car siding, construc-

tion site, material yard or other locations where you need steam.

The famous Cleaver-Brooks four-pass fuel travel means low fuel consumption; the turbine type condensate return system cuts water loss—every drop of condensate goes back to the heater under pressure.

Built for full capacity—full time work—Cleaver-Brooks Tank Car Heaters will give you the most in production hours on the job. Write for bulletins and complete information.

CLEAVER-BROOKS COMPANY
333 East Keefe Avenue, Milwaukee 12, Wisconsin

Write On Your Business Letterhead...
For the Bituminous—mix Calculator—a ready reference slide rule showing weight of mix needed in lbs. and tons in relation to width and depth of area to be covered.



Cleaver-Brooks

PIONEERS AND
ORIGINATORS OF

TANK CAR HEATERS... BITUMINOUS BOOSTERS... AUTOMATIC STEAM-PLANTS

GLASS BEADS for Highway Center Lines by CATAPHOTE

Now—the makers of famous CATAPHOTE Reflector Buttons and Reflectorized Highway Signs offer another outstanding product—CATAPHOTE Glass Beads for highway center line striping. Durable... brilliant quality... dependable... economical. Write for more details. Cataphote Corporation, Toledo, Ohio.

★ ★ ★

New Concrete Channel 15,000 Feet in Length

(Continued from preceding page)

tive fire-box fire-tube boiler. A small 40-hp auxiliary upright boiler was also brought out to the job, but it was not sufficiently powerful to operate the hammer at its rated speed of 110 blows per minute for more than two or three minutes at a time.

Top elevation of the finished steel pile work was 10 feet above the stream bed, giving 50 feet of penetration.

In addition to the pile driving at the outlet structure, a derrick-stone apron and a levee and groin covered by a gravel blanket with quarry-stone facing were built. The trench at the toe of the levee slope was excavated by dragline, and derrick stone was placed by a P&H crane swinging an Owen rock grapple. The gravel blanket, consisting of 12 inches of aggregate graded from No. 4 sieve size to 1½ inches, determined by field conditions, was dumped along the slope by trucks and spread by a crew of ten laborers. Quarry stone in the facing was placed by the P&H crane, working from the bottom of the slope.

Following are the requirements for various types of stone used in the outlet structure:

QUARRY STONE	
Weight of Pieces	Percentage
1 to 3 tons	Not less than 40 nor more than 60
10 to 500 pounds	Not less than 15 nor more than 25
DERRICK STONE	
Weight of Pieces	Percentage
3 to 7 tons	Not less than 40 nor more than 60
10 to 500 pounds	Not less than 10 nor more than 20
Any other stone varied from 500 pounds to 3 tons.	

Personnel

For the San Bernardino County Flood Control District, Howard L. Way, the County Surveyor, is Chief Engineer. R. V. Ward is Assistant Engineer. Ralph W. Motherspaw is Construction Superintendent.

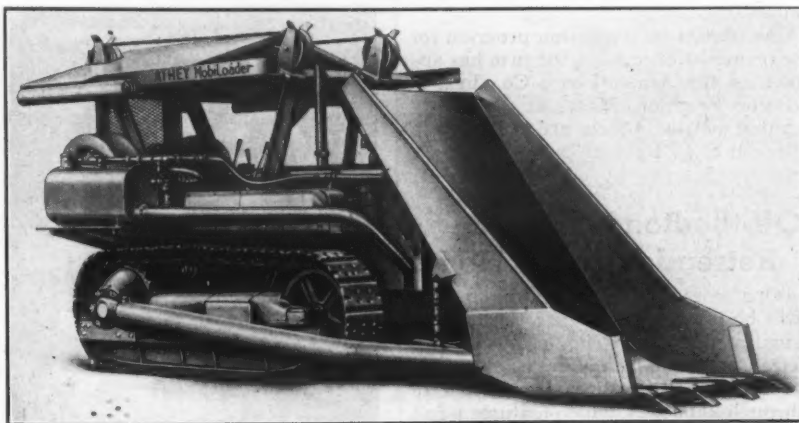
During the major portion of the construction program, the Los Angeles Engineer District was headed by Colonel Rufus W. Putnam, District Engineer, with Lt. Col. Oliver H. Ochsner as Operations Officer. F. C. Bennett was Resident Engineer, succeeded by James G. Morgan.

For the Bressi-Bevanda-Macco Co., Roscoe P. Downs was Project Manager, with Al Erickson as General Superintendent and Harry Porter, Chief Engineer. Ross Phillips was Assistant Superintendent in the field, and Charles Eddy was Office Manager.

New Tractor Loader Has Improved Design

A new addition to its line of Mobiloaders, the W4-5, has been announced by the Athey Products Corp. This new model has basically the same overhead loading principle as the other Mobiloaders, but features design improvements for better performance and reduced maintenance. It is built for use with Caterpillar D4 tractors.

A streamlined mounting permits full accessibility to the tractor engine. Better operating response and an increase



The latest addition to the Apcor line is the Mobiloader W4-5 for use with Caterpillar D4 tractors.

in the efficiency of the power take-off are said to result from the use of hydraulic clutches to actuate the loader's cable. Weight savings have been incorporated with strengthened design in parts subject to the greatest stresses,

Athey says. Balanced mounting on the tractor is designed for maximum traction with minimum wear on idlers and rollers. Interchangeable buckets for the W4-5 includes a 54-inch standard and 74-inch alternate for use with vari-

ous types of materials. A bulldozer blade can be installed on the lift arms.

Those interested in more complete details on the new W4-5 Mobiloader should write the Athey Products Corp., 5631 W. 65th St., Chicago 38, Ill., and mention CONTRACTORS AND ENGINEERS MONTHLY.

Conveyor Line Described

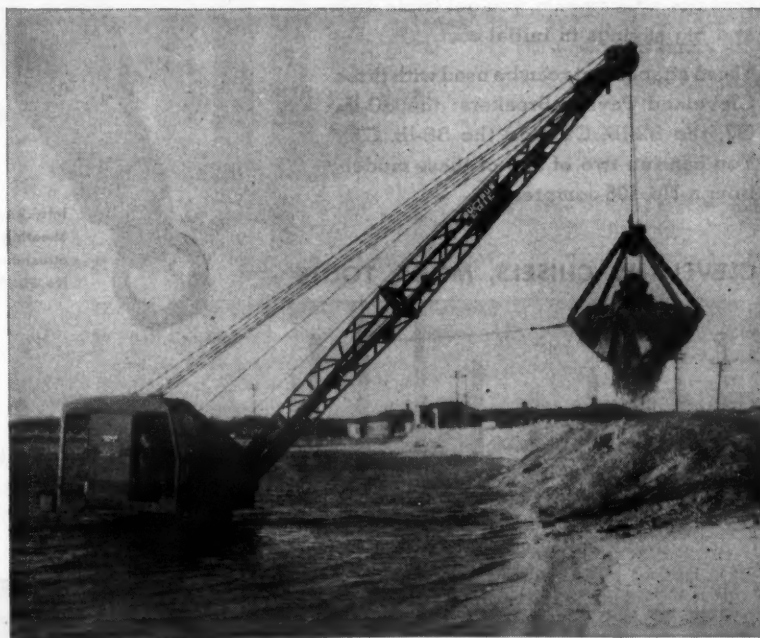
Loaders and conveyors for a wide variety of material-handling jobs in aggregate plants and departmental yards—jobs ranging from snow removal to concrete handling and placing—are featured in a new 24-page catalog published by the George Haiss Mfg. Co. Photographs in the attractive booklet show actual use of the many Haiss portable conveyors; diagrams illustrate construction details; and charts present specifications.

Copies of Catalog 1245 can be secured, on mention of this notice, from the George Haiss Mfg. Co., Canal Place & E. 142nd St., New York 51, N. Y.

no time out for wet feet

IT'S characteristic of Bucyrus-Erie ¾ to 2½-yard excavators to wade right in and slug it out with the tough jobs—staying in there digging, shift after shift, delivering the high percentage of actual working time that really boosts output.

YOU ADD EXTRA OUTPUT WITH THE EXTRA
DIGGING TIME BUCYRUS-ERIES GIVE YOU



**BUCYRUS
ERIE**

SOUTH MILWAUKEE, WISCONSIN

you make the
most of
EVERY HOUR
with a
BUCYRUS-ERIE

Here are **8**
reasons why

- 1 All adjustments are easily made and lasting.
- 2 Parts are simple, large, few in number and enduringly aligned—there's little to go wrong.
- 3 Machinery is accessible for quick, easy repairs, parts replacement, and lubrication.
- 4 The digging cycle is balanced, coordinated, fast. There's no overstressing of parts to cause too-frequent adjustments and repairs.
- 5 All controls are conveniently grouped in one place—no hopping about the machine to cause digging delays.
- 6 Performance is smooth, quiet—easy on both machine and operator.
- 7 Design is individual—each machine is especially fitted to its range of work.
- 8 Moves are fast, sure. Machine is easily steered, makes sharp or gradual turns, climbs grades to 30%.

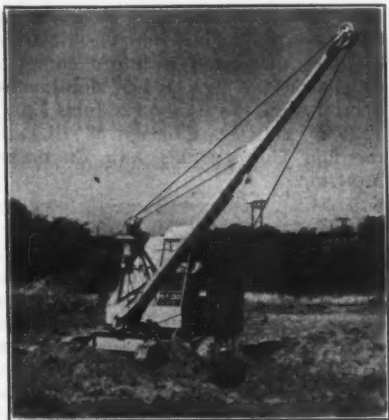
**SAVE 50% ON FUEL AND
WAITING TIME**

when Heating
& Melting
Tar &
Asphalt



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AEROIL THE
FAMOUS
HEET-MASTER

55, 80, 115 and 165 gallon sizes on skids, on steel wheels and on pneumatic tires. Send for FREE Bulletin No. 280CE (specifications, prices, etc.)
AEROIL PRODUCTS CO.
5775 Park Avenue, West New York, N. J.
Chicago 16 San Francisco 7 Dallas 1



The Byers Junior rigged as a dragline has a 28-foot tubular boom.

New Light Excavator Has High Portability

Small contractors and county and town officials will be interested in a light and unusually portable excavator, the Junior, announced by the Byers Machine Co. Highly mobile, the unit has a $\frac{3}{4}$ -yard capacity, and weighs less than 8 $\frac{3}{4}$ tons.

The Junior has partial-swing operation, fully enclosed cab, new dipper trip, worm-and-gear boom hoist, over-size clutches which are all the same size and have interchangeable linings, and self-cleaning crawler treads. It is powered by a 37 $\frac{1}{2}$ -hp industrial engine which transmits its power in direct flow through wide-faced machine-cut gears. The cab and all working machinery for the excavator are located on a non-weaving structural main frame, 14 inches deep, and do not swing with the boom. Gears, clutches, drums, and shafting are set low on the main frame, giving a very low center of gravity to increase resistance against tipping.

For complete information and catalogs on the new Junior excavator, write the Byers Machine Co., Ravenna, Ohio.

Fence, Wire-Rope Dealers

Distributors for Wickwire Spencer wire rope and fence have been announced by the firm's New York office. The Milton Hale Machinery Co., Inc., with offices in Syracuse and Albany, N. Y., will handle the sale of wire rope in its vicinity. The firm has headquarters at 438 E. Brighton Ave., Syra-

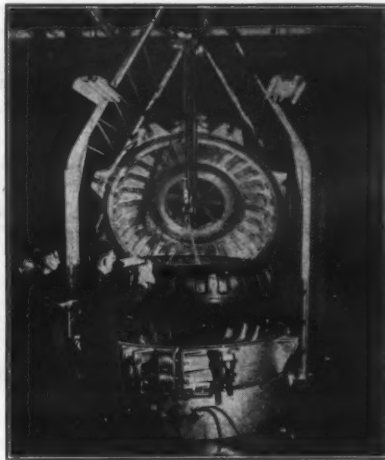
cuse 10.

As part of its expansion program for wire-mesh-fence sales, the firm has appointed the Armor Fence Co., Inc., of Boston-Brighton, Mass., as distributor in that district. Offices are at 191 North Beacon St., Brighton 35.

Off-the-Road Tires Retreaded in 48 Hours

Operators of off-the-road equipment will be interested in a new service inaugurated by the Thompson Aircraft Tire Corp. The firm offers a retreading process for all tire sizes, from 6.00 x 16 through 21.00 x 24, which features a full retread rather than top or full capping. The process can be accomplished in 48 hours, a company official says. At present the service is available west of the Mississippi only.

Pointing out that the remodeling of tires in their original molds has never been entirely successful because of the natural growth of the tire in service, the



This new giant mold makes possible re-treading the huge tires used on dirt-moving and other off-the-road equipment. This service is now available only west of the Mississippi.

Thompson firm has installed special types of molds. The built-up tire is

measured and the mold adjusted to fit. All old rubber is removed before molding the tire again. This makes it possible to detect shoulder or ply separation and hidden casing injuries. A new special-purpose tread put on the remolded tires is non-directional in design.

More complete details on this re-treading process can be secured by writing the Thompson Aircraft Tire Corp., 18th & Minnesota Sts., San Francisco, Calif. Mention this magazine.

I-H Research Center

The establishment of a research center devoted to the improvement of manufacturing methods and procedures for its entire line of products has been announced by the International Harvester Co. To be located at Chicago, the center will include eight separate laboratories, all related to specific manufacturing functions. M. C. Evans, Manager of the firm's Manufacturing Research and Training Department, will direct the new activity.

Use 1 CLEVELAND tool

★ PAVING BREAKING

★ SHEETING DRIVING

★ SPIKE DRIVING

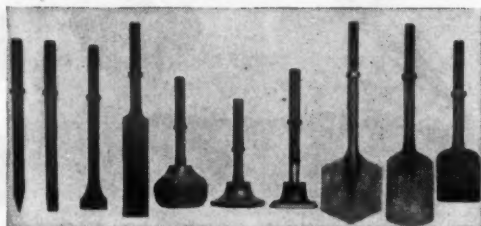
for 3 jobs!

Of course, you will find husky, air-saving Cleveland Paving Breakers ideal for tearing up paving, demolition work, frost breaking, ripping up foundations, breaking shale, hard ground, etc. In addition, they are readily adaptable for other jobs. You can quickly change to the Sheeting Driver Attachment. It handles 2" or 3" sheeting and never splits or "brooms" the boards. Another easy change of the front head, and your tool becomes a powerful Spike Driver.

Thus by purchasing one Cleveland tool plus two attachments, you get triple duty at a big savings in initial cost.

These attachments can be used with three Cleveland Paving Breakers: the 80-lb. C7, the 82-lb. C9, and the 58-lb. C11. You can run two of any of these models from a No. 105 compressor.

CLEVELAND CHISELS, MOILS, TOOLS



Moil Narrow Wide Digging Sheeting 7" Tamper 5" Tamper Clay Clay Asphalt Chisel Chisel Blade Driver Bar Bar Blade Spade Cutter



• ASK FOR BULLETIN 128. It tells all about Cleveland Paving Breakers, Spike Drivers, Sheeting Drivers, Moils and Chisels, and Air Line Accessories.

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BOOTS or CLOTHING

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CONTINENTAL

RUBBER WORKS

1815 PENNSYLVANIA AVE. U.S.A.



As a result of vehicles coming down a steep grade and making the sharp turn shown at the left to use this old covered bridge in Indiana, a side thrust was developed in its members. This was corrected and the 92-year-old structure strengthened recently by the Highway Commission.

New Bents Restore Old Covered Bridge

92-Year-Old Structure Given New Lease on Life At Request of Residents, Who Worked on Job

+ THE interesting old covered timber bridge across the deep gorge of Sugar Creek near Yountsville, in west-central Indiana, has been saved from oblivion by the Maintenance Division of the Indiana State Highway Commission, which strengthened the 92-year-old span last summer by erecting a sturdy timber bent to give additional support in front of each abutment, thereby prolonging the life of this pioneer landmark. Located on State Route 32, about 5 miles west of Crawfordsville in Montgomery County, the aged span had been carrying 10-ton loads during the war period, even though it was posted for only 1-ton traffic.

Over the years, vehicles approaching the bridge from the east had to come down a sharp grade and then turn immediately to the left, thereby inducing a side thrust in the bridge members which resulted in the superstructure's shifting laterally nearly 6 inches on the abutment. The outside lower chords at each end of the bridge had also cracked, and a 1-foot lateral bow was measured at the center of the span. That the structure remained intact for so long a time can be credited to the design, workmanship, and choice of materials of construction that went into the building of this bridge back in the year 1854.

The wooden structure is a combination of a Howe through truss and arch ring, made from yellow poplar or oak timbers held together by oak pegs and iron bolts. The bridge spans, with a single leap of 160 feet, the broad expanse of water 40 feet below which has cut its deep channel into the Indiana sandstone over countless centuries. It is one of the earliest of Indiana's covered timber bridges, and although from time to time some wooden members have been replaced, the foundations remain in their original state. On the east bank the superstructure rests on a seat carved into the natural rock and no shifting has occurred at this point. The west abutment is a rugged masonry pier

of Indiana limestone, and it is here that the bridge superstructure had shifted slightly to the north or upstream side of center.

It is one of the few remaining "double-tunnel" covered bridges; that is, it has two 11-foot lanes for traffic separated at the center by two parallel arch

trusses, with another arch at each side from which the wooden side boards had peeled off in several places. The width outside to outside is 32 feet, and the vertical clearance for vehicles is 11 feet 4 inches. The elevation of the bridge floor is 452, a safe distance above the flood waters of 1913 when, although the

swollen creek reached its highest mark of 434.7, the foundations stood unyielding.

Bridge Repairs

As a safety precaution the bridge was closed to traffic in June, 1945, and after a careful study the Indiana highway engineers decided that repairs could be made by adding temporary supports which would render it safe for further use. These supports consist of timber bents erected out in the stream, 22 feet from the face of each abutment, at the point where the arch "breaks" as it passes through the floor of the bridge on the way to its seat in the face of the abutment. The work was done in mid summer when the low level of the creek simplified the construction of sand-bag cofferdams used in preparing a foundation for the new bents.

Layers of from three to five bags were placed on the sandy creek bottom to form a cofferdam 40 feet long x 15 feet wide which was then unwatered

(Concluded on next page)

This plant, with 25" x 40" Jaw Crusher and Apron Feeder, will produce 50 yards of 2-inch crushed rock per hour.

50 CU. YDS.
or
500 CU. YDS.



THE AUSTIN-WESTERN LINE OF CRUSHING EQUIPMENT INCLUDES:

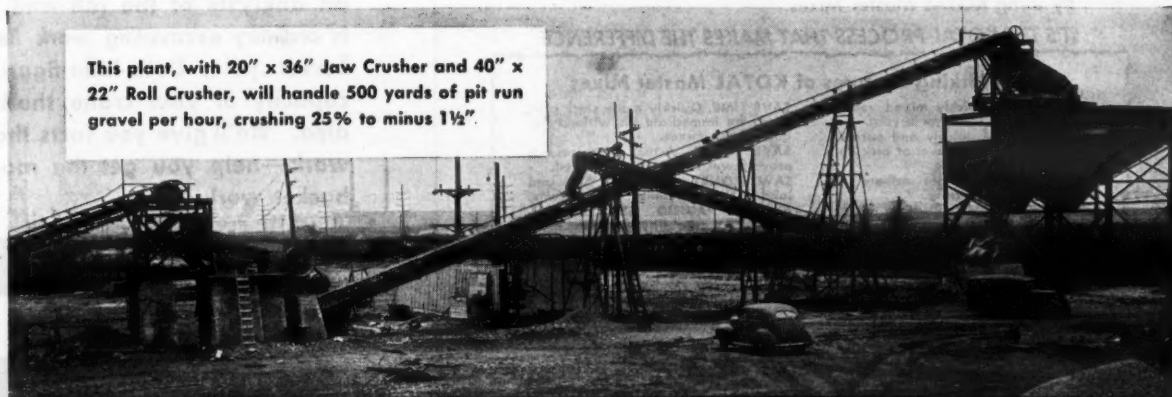
Jaw Crushers and Roll Crushers in a wide range of sizes; plus matching screens, elevators, conveyors, and bins.

Semi-portable and portable crushing and screening plants, from the smallest to the magnificent two-unit and three-unit plants which combine maximum output with wide variety of specification; giving the owner flexibility of operation that spells maximum profits.

Your nearby Austin-Western distributor will be glad to recommend the plant or equipment best suited to your needs.

AUSTIN-WESTERN COMPANY, AURORA, ILL., U.S.A.

This plant, with 20" x 36" Jaw Crusher and 40" x 22" Roll Crusher, will handle 500 yards of pit run gravel per hour, crushing 25% to minus 1½".

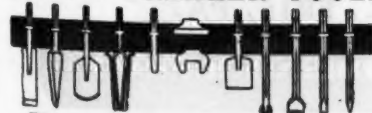


BUILDERS OF ROAD MACHINERY

Austin Western

SINCE 1859

"BICKNELL BETTER BUILT" PAVING BREAKER TOOLS



We manufacture a complete line of tools for pneumatic paving breakers, rock drills and diggers.

Write for descriptive circular
BICKNELL MANUFACTURING CO.
12 LIME STREET ROCKLAND, MAINE

Old Bridge Restored

(Continued from preceding page)

by a C. H. & E. 3-inch pump. About 4 feet of sand was then excavated by hand until solid rock was reached. Five round holes were then drilled in the limestone into which the five piles making up the bents were later set. Holes with a 22-inch diameter were chiseled out to a depth of 1 foot by an Ingersoll-Rand Jackhammer powered by an Ingersoll-Rand 105-cfm compressor mounted on an Indiana truck and stationed at the end of the bridge.

Red-oak piles, each 45 feet long with a 22-inch butt and a 12-inch tip, were drilled with the holes necessary for their fabrication into a bent and were lowered into the gorge below. The piles and timber bracing were assembled along the shore of Sugar Creek and then raised into position by a Michigan truck crane with a 25-foot boom, after some of the floor system at each end of the bridge had been removed so that the cable from the truck winch could be

attached to the bent beneath. The five piles were then capped with a 12 x 12, 32 feet long, but enough room was left between the top of the cap and the lower bridge members so that wedges could be driven in the space remaining to make a firm seat for the span on the new support. In this way part of the bridge load was transferred to the new auxiliary abutments, and further strengthening of the structure was achieved by reducing the clear horizontal span from a length of 160 feet to 116 feet.

The two outside piles are set on a batter of 1 on 12, the two intermediate piles 1 on 24, with the center pile set vertical. At the base the piles are given greater stability by concrete pedestals, 4 feet deep and 3 feet wide, which were built around them on top of the rock into which they are framed. The piles were laced together into bents by a close system of cross bracing using 3 x 12's, 22 feet long. The bents are also tied into the lower bridge members with 3 x 12 knee braces placed on each

side of the outside and center piles.

Personnel

The work of assembling and erecting the two pile bents was done during August, 1945, after which the bridge was again opened to traffic. A maintenance bridge foreman of the Highway Commission was assigned to the project, but difficulty was encountered in obtaining a crew to do the work. Finally, however, help was secured from residents living in the vicinity of the bridge who had petitioned the Commission to save the picturesque structure. Eight local men volunteered to work on the bridge under Foreman L. P. Shaw.

The Maintenance Division of the Indiana State Highway Commission which sponsored the work is headed

by Superintendent Charles T. Miser, a licensed civil engineer, who had been a member of the Indiana House of Representatives from 1941 through 1945, during which period he served on committees for such public works as roads, dikes, swamp drainage, railroads, etc. He has been with the Highway Commission since February, 1945.

Lincoln Expands Staff

Expanding its field welding-engineering service, the Lincoln Electric Co., Cleveland, has added four district representatives: John F. McFeeters at Kansas City, Mo.; Hubert G. Hinkle at Columbus, Ohio; K. S. Lamb in the New York territory; and Thomas W. Day at St. Louis, Mo.



"We're using KOTAL Mixes All Year 'Round!"

There's a world of difference between ordinary cold mixes and KOTAL Cold Mixes! KOTAL Master Mixes are tougher; more stable; resist stripping; handle easier and last longer. KOTAL Master Mixes are known as the "all-seasons pavement." They lay equally as well in cold, wet weather as in hot, dry, summer weather. KOTAL Master Mixes can be "stock-piled." Whether your plant is running or not, KOTAL Master Mixes will be available for the needs of your customers.

Keep your crews busy—Spring—Summer—Fall—Winter—by using KOTAL Master Mixes.

IT'S THE KOTAL PROCESS THAT MAKES THE DIFFERENCE

Eight Working Features of KOTAL Master Mixes

EASY TO USE. Quickly mixed, ready to lay. No preheating or drying.
STABILITY. Cure quickly and permanently. Do not shift, ravel or pick up. Open sooner to traffic.
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LONG-TERM STOCK PILES. Can be stock-piled for many months without losing workability.

SAVE TIME. Quickly made stock piles ready for immediate use without frequent fresh mixes.
SAVE LABOR. Actual road records prove fewer labor hours required.
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EXTEND PAVING SEASON. All-weather workability permits more months of operation.

Write for your copy of booklet which tells the story of KOTAL Master Mixes. We will also send you the name of your nearest supplier.



KOTAL COMPANY • 52 Vanderbilt Ave. • New York 17

KOTAL Master Mixes
The Advanced All-Weather Aid in Building Better Roads



HIGHWAY STEELS



WIRE MESH
Slab reinforcement keeps cracks closed and holds slab together.



DOWEL SPACERS
Assures correct alignment and simple installation of shear dowels.



CENTER JOINT
For controlling longitudinal cracking of pavement.

Specify Them!!

REPORTED HIGHWAY RESEARCH INDICATES STEEL REINFORCEMENT IS NECESSARY IN PAVEMENTS FOR LONG LIFE AND LOW MAINTENANCE.

LACLEDE STEEL COMPANY
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DO YOU OPERATE AN \$18,000 BUCKET?

If you operate an \$18,000 crane on bucket work, you most certainly operate an \$18,000 bucket, for your entire crane investment during that period depends upon the efficiency of the bucket. We know a contractor who operated a used 1/2 yd. bucket when an analysis of the job and crane called for a 3/4 yd. bucket. In ordinary excavating work he lost 10 cu. ft. of pay load on every bucket cycle. Do a little figuring or better yet, wire us collect the capacity of your crane, the boom length, and the material handled. We'll give you facts that will mean more profits on bucket work—help you get the most out of your crane investment on bucket work.

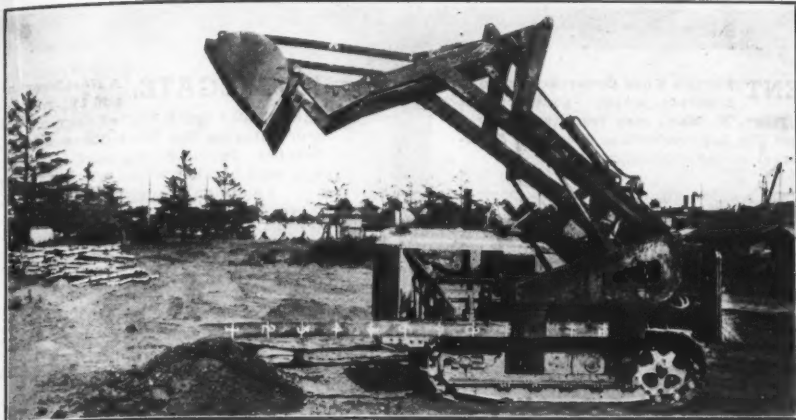
ERIE STEEL CONSTRUCTION CO.

265 GEIST RD., ERIE, PA.

BUCKETS • AGGREGATORS • PORTABLE CONCRETE PLANTS

BUY all the Bonds you can . . .

KEEP all the Bonds you buy



The new Drott Hi-Lift loader, with a 1 1/4-yard bucket as standard, is made for use with Oliver Cletracs. The rule shows the 5-foot forward reach of the bucket.

Hydraulic Loading Unit for Tractors

Tested under field conditions for over a year, a new loader for mounting on Oliver Cletrac tractors has been announced by the Drott Mfg. Corp. This Hi-Lift loader, a hydraulically controlled unit, is designed to aid in reducing material-handling costs.

The new unit is featured by a high lift of 10 feet 8 inches, and the ability to dump its load 5 feet ahead of the tractor. Controlled dumping, operated from the driver's seat, permits the depositing of the load either in part or all at once. The load is not carried on the tractor proper, but semi-skidded as a result of an arrangement that transfers the burden to the shoes. The shovel rolls back so as virtually to eliminate spillage in transporting or lifting. The unit can be used for light bulldozing, down pressure can be applied to it at will, and a depth gage allows the operator to set the blade at any desired cut.

The standard general-purpose Drott shovel for use with Oliver Cletrac tractors is the Model 60 Hi-Lift loader. This unit has a 1 1/4-yard capacity, while a shovel for handling light materials is made in 1 3/4-yard size.

Full information on the new Hi-Lift may be obtained by writing the Drott Mfg. Corp., 5141 N. 35th St., Milwaukee 9, Wis., and mentioning this news item.

Ceco Expansion Program

Several steps designed to increase the availability of structural building materials have been taken by the Ceco Steel

FORM WIRE ROPE LOOPS

the Easy Way with

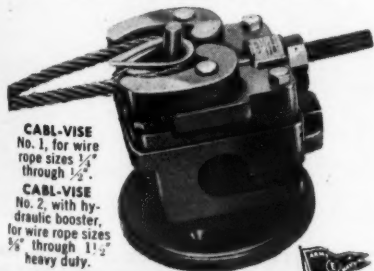
CABL-VISE

MOUNTED ON SWIVEL BASE

CABL-VISE is the handiest method for forming and holding wire rope loops ever devised. Compact—sturdy—positive—inexpensive.

No Shop handling wire rope can afford to be without it! Inquire today.

Another NUNN Product



CABL-VISE No. 1, for wire rope sizes 1/4" through 1 1/2".
CABL-VISE No. 2, with hydraulic booster, for wire rope sizes 1 1/2" through 1 3/4" heavy duty.

NUNN MANUFACTURING COMPANY
1000 GRAY AVE., EVANSTON, ILLINOIS

one of fourteen owned by the firm, is also being currently enlarged by more than 50 per cent.

Variety of Jaw Crushers

The wide variety of mountings possible for the Model SK jaw crusher made by the Eagle Crusher Co., Galion, Ohio, is shown in a broadside issued by the firm. Made in five sizes, the Model SK features a one-piece frame and can be furnished with either revolving or vibrating screens. In all, twelve different mountings are available for gravel-plant, truck, tractor, trailer, portable, and roadside applications.

The bulletin, Form 144, can be obtained direct from the company on mention of this notice.

Sinclair Ups Zumbrook

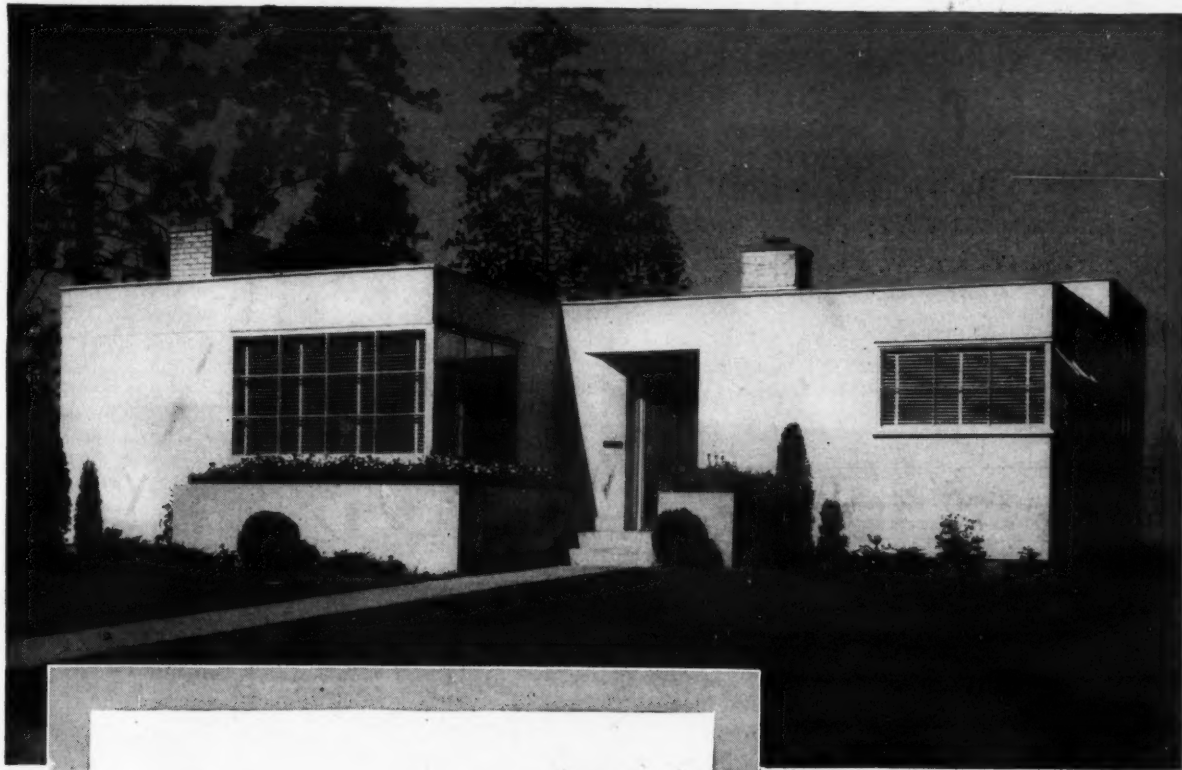
The advancement of Paul W. Zumbrook, Lubricating Sales Manager for the Central District, to the post of Manager of Domestic Lubricating Oil Sales

has been announced by the Sinclair Refining Co., New York City. Active on petroleum-industry committees since the NRA program, Mr. Zumbrook has been with Sinclair since 1916. He will coordinate the sales and service activities of Sinclair's automotive and industrial lubrication staffs.

Portable Generators

Portable electric plants ranging in weight from 48 to 142 pounds are described in a new bulletin, L-406, issued by the Homelite Corp., Port Chester, N. Y. The leaflet illustrates some of the many uses for these generators and shows various models. It features the "inside story" of a Homelite, through a captioned cutaway photograph. The plants are capable of producing from 500 to 5,000 watts, ac or dc, in 6 to 230 volts.

Copies of Bulletin L-406 can be obtained by writing the firm and mentioning CONTRACTORS AND ENGINEERS MONTHLY.



Douglas Fir Plywood Again Allocated

-To Meet the Urgent Needs of the Reconversion Housing Program

TODAY'S most urgent and immediate need is for housing—and the Douglas fir plywood industry pledges complete cooperation with the Reconversion Housing Program.

The demand for housing requires that Douglas fir plywood again be put on an allocation basis. This means that a substantial proportion of the industry's production will be channelled to housing contractors, stock cabinet manufacturers, prefabricators and distributors.

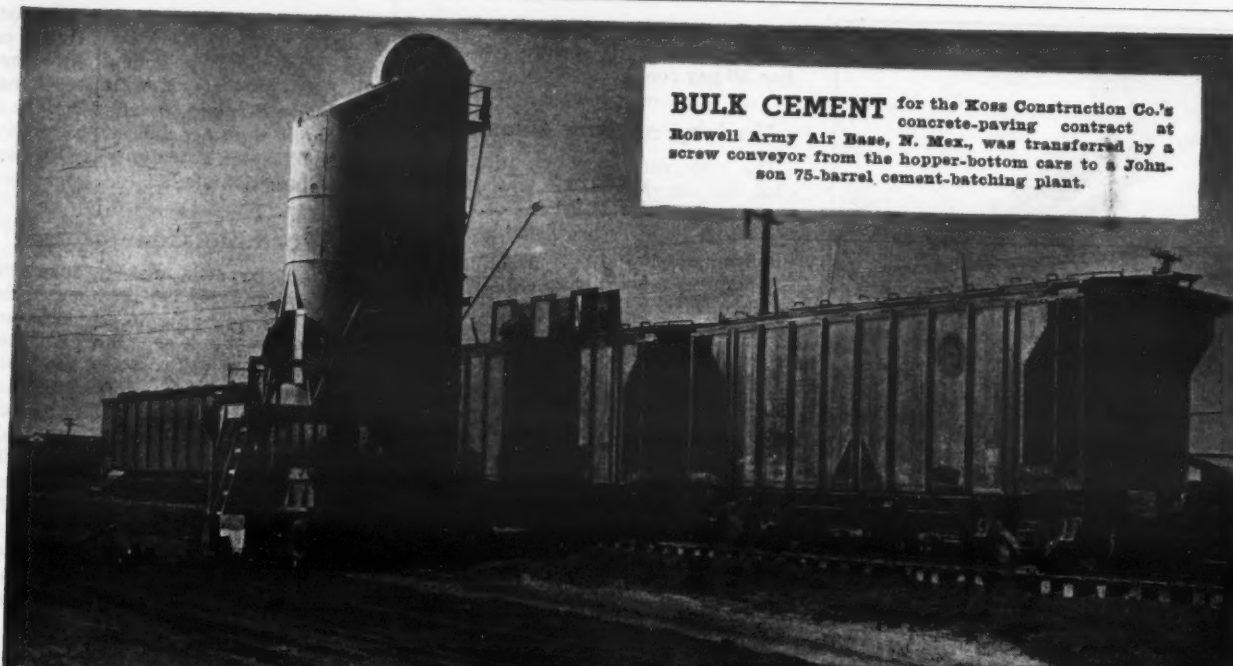
As a result, the present supply situation for all other industrial and construction uses will be temporarily aggravated.

May we strongly urge you to anticipate your needs far in advance—and discuss your requirements with your regular sources of supply.

Even though today the supply situation in Douglas fir plywood is critically short, for many projects such as forming concrete surfaces, for signs and display work, for boat building, and for many other industrial and commercial uses, it is almost indispensable. In these cases it is well worth waiting for, as it will save time and labor and do a better job.



Douglas Fir Plywood Association
Tacoma 2, Washington



BULK CEMENT for the Koss Construction Co.'s concrete-paving contract at Roswell Army Air Base, N. Mex., was transferred by a screw conveyor from the hopper-bottom cars to a Johnson 75-barrel cement-batching plant.

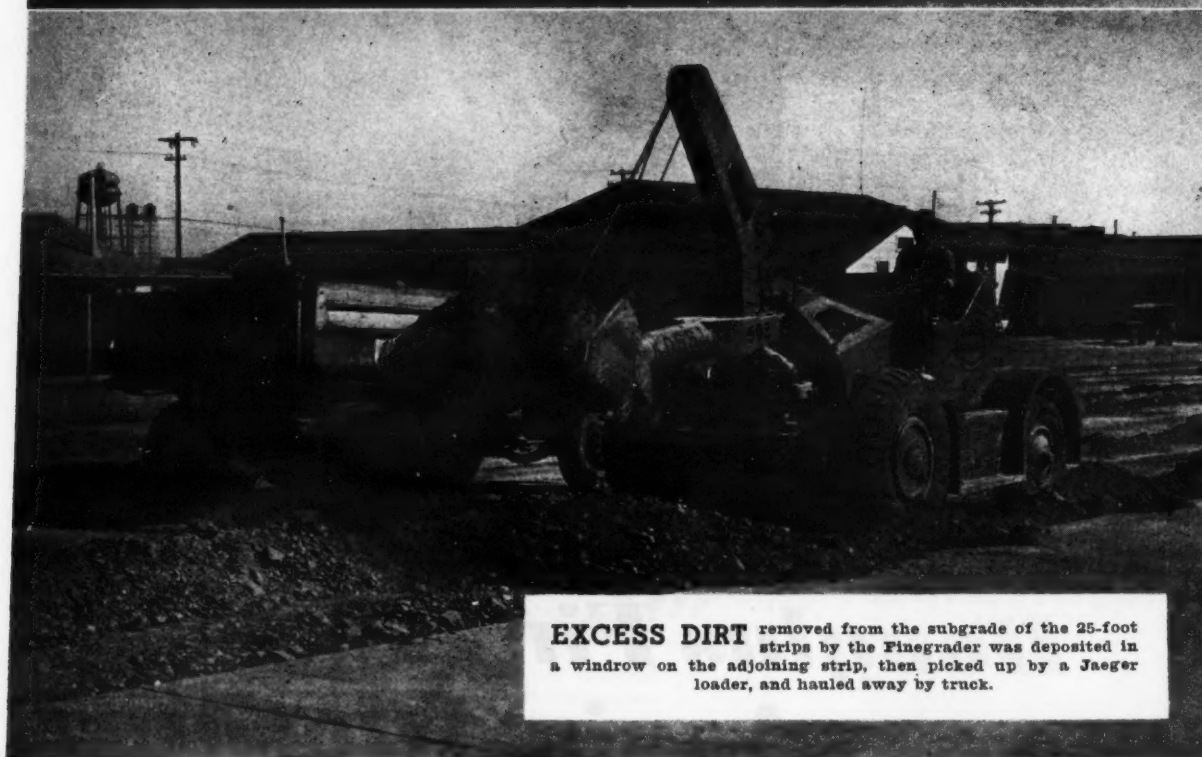
AGGREGATE. A Northwest crane and 1¼-yard clamshell loaded truck-hauled aggregate from stockpiles to the Blaw-Knox double-batchers. In the background is the Johnson sand batcher which was served by an American crane and clamshell.



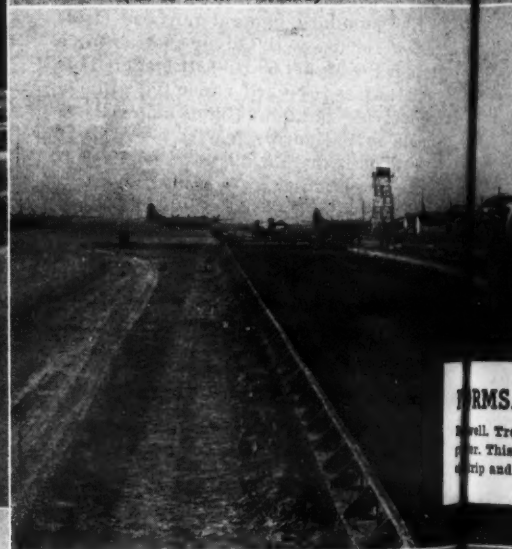
Concrete Parking Apron

Contract for 200,000
Of Concrete Paving
Subgrade Speeded by
Equipment and Careful

(C. & E. M. Photos)



EXCESS DIRT removed from the subgrade of the 25-foot strips by the Finegrader was deposited in a windrow on the adjoining strip, then picked up by a Jaeger loader, and hauled away by truck.



FORMS.
Small. Tr.
per. This
strip and

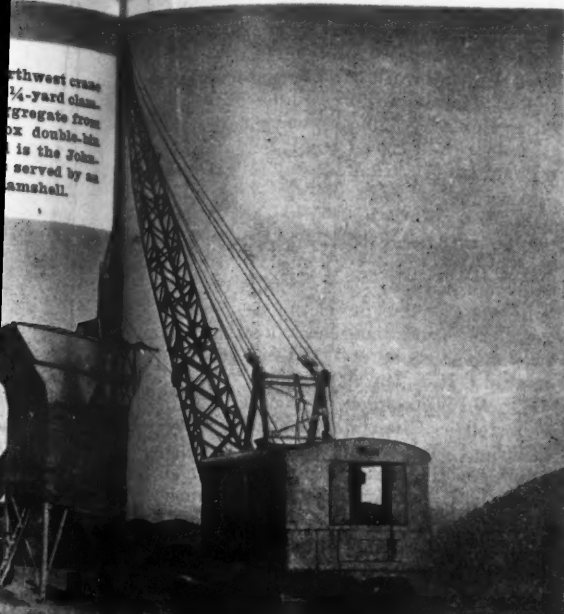


SPREADING. A Jaeger spreader followed the paver, spreading and tamping the concrete. This machine also carried two Jackson electric vibrators which consolidated the edges of the slab.



FINISHING. Hand finishers with long-handled floats followed the Koehring Longitudinal Finisher, and then a final herringbone finish was put on the slab by two workmen using a 4-inch x 25-foot tool.

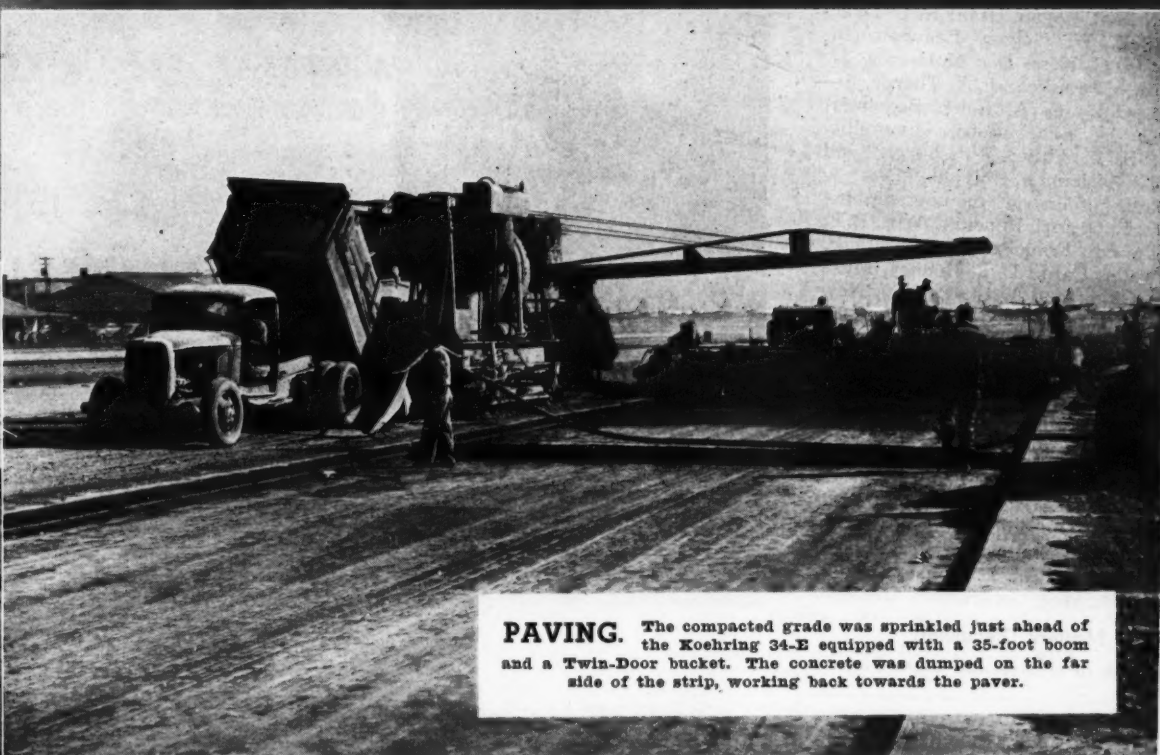
Northwest crane
24-yard clam-
net aggregate from
or double-hin
is the John
served by an
amshell.



SUBGRADE. The 9 and 13½-inch plain concrete was laid on a foundation of sand and silt, compacted by sheepfoot rollers to plus 95 per cent maximum density. A Buckeye Finegrader prepared the subgrade which, after careful checking, was given the finishing touch by the roller at the left.

on Paved at Army Air Base

for 200,000 Square Yards
Paving on 6-Inch Processed
Speeded by Efficient Use of
and Careful Planning of Work



PAVING. The compacted grade was sprinkled just ahead of the Koehring 34-E equipped with a 35-foot boom and a Twin-Door bucket. The concrete was dumped on the far side of the strip, working back towards the paver.

FORMS. About 6,000 feet of Blaw-Knox steel forms were available on the Koss contract at Well. Trench for the forms was cut by a Carr Form-guer. This general view of the work shows a complet-rip and preparation of the grade for the next strip.



CURING compound was applied by power sprays at the rate of 1 gallon per 100 square feet. The contract for this 200,000-square-yard concrete parking apron was awarded to the Koss Construction Co. of Des Moines, Iowa, by the U. S. Engineer Office at Albuquerque, N. Mex.



h long-haul floats
ing Long-haul Fin-
n was put on the slab
-foot inch.

AGC Surveys Problems At Recent Convention

New Officers for 1946; Committee Reports; Awards Made; Pleas for Mobilizing Industry for Job Ahead Under Free-Enterprise System

MEETING in the first "full dress" convention since before the war, the Associated General Contractors of America gathered at Chicago in February for their 27th annual conclave. President Harry A. Dick, Portland, Oreg., presided over the sessions which featured extensive discussion of the many problems facing the construction industry.

Warren S. Bellows of Houston, Texas, was chosen to succeed Mr. Dick as AGC President. Forrest W. Parrott of Sioux City, Iowa, was elected to the Vice Presidency, and a former President, William Muirhead of Durham, N. C., was named Secretary-Treasurer. The title of Treasurer Emeritus was conferred on E. M. Rust on his retirement.

Three-year terms on the Governing Board were voted to J. B. Warrack, Seattle; C. L. Harney, San Francisco; C. E. Nelson, Logan, Utah; H. C. Dyer, Dallas; E. W. Geiger, Leavenworth, Kans.; G. C. Koss, Des Moines; E. H. Schmitt, Milwaukee; J. A. Thorpe, Jr., Akron, Ohio; C. A. Long, Bessemer, Ala.; F. L. Shackelford, Greenville, S. C.; S. L. Fuller, Pittsburgh; and Daniel J. O'Connell, Holyoke, Mass.

Because of district membership increases, E. O. Earl, Phoenix, Ariz.; B. F. Modglin, San Francisco; John McLeod, Clearwater, Calif.; L. F. Rooney, Muskogee, Okla.; and W. J. Barney, New York City, were named as Directors for one year.

Division elections resulted in the appointment of M. E. DeWitt, Poplar Bluff, Mo., as Chairman of the Highway Contractors' Division, with J. R. Winger, Portland, Oreg., as Vice Chairman. Carl B. Jensen, Pittsburgh, heads the Heavy Construction and Railroad Contractors' Division, aided by George Atkinson, San Francisco. W. K. Shaw, New York, and W. L. Couse, Detroit, lead the Building Contractors' Division.

Matters Discussed

Because of strikes and other factors,

the immediate outlook for highway building is not too bright, M. J. Hoffmann, President of the American Association of State Highway Officials, told the meeting. However, highway work will not interfere with housing needs, once under way. Machinery production and the strike situation were discussed by G. K. Viall of the Chain Belt Co.

Lt. Gen. Raymond A. Wheeler, Chief of Engineers, U. S. Army, urged that flood-control and navigation projects not be deferred, lest industries bordering rivers be retarded in their return to production normalcy. Present and future plans of the Bureau of Yards and Docks were outlined by Rear Admiral H. G. Taylor.

A construction volume that may reach \$9,000,000,000 in 1946 was forecast by John J. Haynes, Chief of the Construction Division, U. S. Department of Commerce. The results of the President's Labor-Management Conference were discussed by the construction industry's delegate, Edward P. Palmer. Richard J. Gray, an official of the

American Federation of Labor, talked on labor-employee relations, and W. J. Barney on the AGC's apprenticeship program.

The "use" method is the most desirable one for taking depreciation of equipment, John C. Hayes, Washington attorney, told the contractors. He outlined the present and proposed Federal tax structure, and urged accurate record-keeping as one of the most vital aspects of business management.

In letting bids for the 3,000,000 line poles which it plans to install, the Rural Electrification Administration plans to use an "escalator clause" to protect the contractor against rising material prices after the date of letting, John K. O'Shaughnessy reported. The REA will accept amendments to contracts to permit reimbursement of the contractor up to 90 per cent of the cost of the materials upon their delivery to the site, before being installed.

Business Transacted; Awards

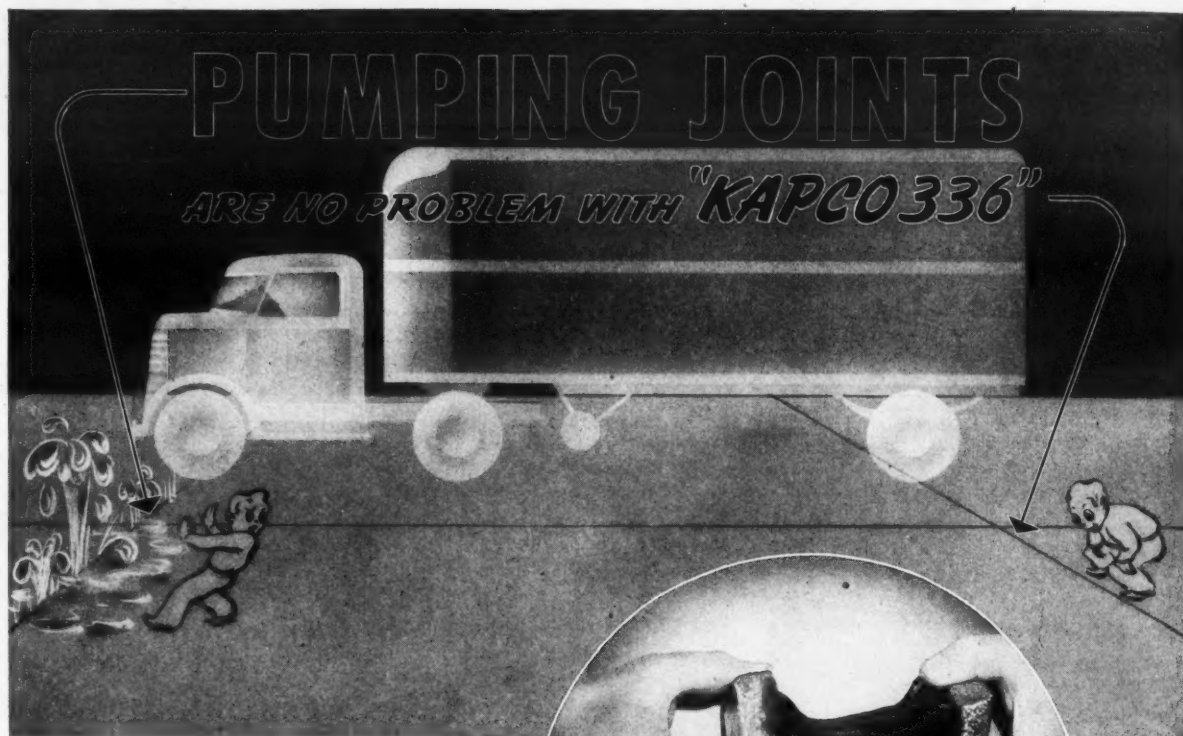
The meeting approved a recommen-

dation, sponsored in conjunction with the AASHO, that efforts be made to promote "more stable conditions" so that highway work can proceed without delay. The resolution pointed out that "a moderate volume of work may accomplish the desired result better than a complete cessation of activity".

A stand against valley authorities patterned after the Tennessee Valley set-up was taken by the meeting "because they establish forms of government contrary to the principles of free enterprise". The development of such resources should be carried out under the supervision of existing governmental bodies, the AGC feels.

D. W. Winkelman, Syracuse, N. Y., reported as Chairman of the Highway Division, and G. W. Maxon, Dayton, Ohio, for the Heavy Construction and Railroad Division. Wage stabilization was discussed by AGC Assistant Managing Director J. D. Marshall, and C. B. Jensen, Chairman of the Labor Relations Committee. F. W. Parrott re-

(Concluded on next page, Col. 2)



How to Melt Asphalt Faster at Lower Cost



THIS
NEW—
FREE
CATALOG
TELLS
ALL
ABOUT

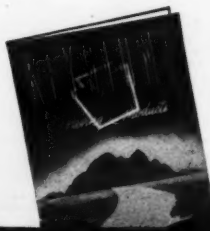
AN IMPROVED HEATING METHOD FOR MELTING Tar—Asphalt—Bituminous Compounds

It describes how the "Speed-Master" Kettle combines a unique down-firing oil burner with an improved internal multiple tube heat-distributing system (that's easily removable for quick cleaning) in an all-insulated kettle, that spells "tops" in melting speed, and fuel economy.

The "Speed-Master" is your best bet for high-speed melting. Available in skid or trailer types; capacities 55, 80, 115 and 165-gal.; with hand or power spray equipment, if desired. Investigate "Speed-Master." Write for Catalog 661.

HAUCK MANUFACTURING CO.
116-126 TENTH STREET
BROOKLYN 15 N. Y.

Kapco 336 Joint Sealing Compound, a hot-poured sealer for paving joints, effectively prevents water infiltration and "pumping action" at slab ends. Unaffected by even unusual contraction and expansion, it clings tenaciously to its base and maintains its bond. Will not crack when exposed to below zero temperatures.



The new Keystone Paving Products Catalog is now available. Write today to Dept. C for your copy.



This rubbery asphalt compound meets Federal specification SSF-336.

ONE SOURCE SERVICE

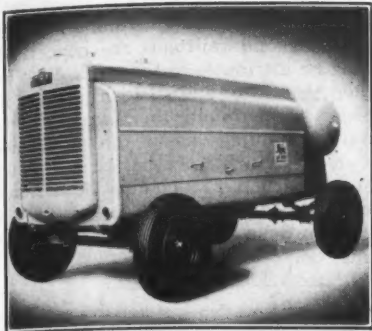
Eliminate bottlenecks with all your paving joints and accessories from one source.

- Mastic Board Tongue & Groove Joints
- Mastic Board Dummy Joints
- Fibre & Asphalt Expansion Joints
- Kapco Concrete Curing Compound
- Subgrade papers
- Sewer Joint Compounds

KEYSTONE ASPHALT PRODUCTS COMPANY

A DIVISION OF AMERICAN-MARIETTA CO.

GENERAL OFFICES: 43 E. OHIO ST., CHICAGO 11, ILL. MFG. PLANT: CHICAGO HEIGHTS, ILL.



The new Le Roi Airmaster series of air compressors is available with gasoline or diesel power, and a variety of mountings for ready portability.

New Compressor Line Has Modern Design

Modern design has been incorporated throughout the new line of portable air compressors announced by the Le Roi Co., Milwaukee 14, Wis. Known as the Airmaster series, they are said to provide a degree of efficiency and of true portability never before attained by the firm's machines. Ten models, powered by gasoline or diesel engines, comprise the line.

Emphasis in the construction of these new compressors has been directed towards functional utility, Le Roi states. Many of the improvements and innovations are the result not only of the firm's 23 years of commercial manufacture, but also of its extensive wartime operations. A wide range of mountings is possible in the series, including skid, 2-wheel, 4-wheel, and truck. All wheel mountings are spring-balanced.

Push-button electric starting; lockable tool boxes; full-length built-in hinged doors; waist-high protected fuel tanks; and double-spring towing devices are among the many features. The Le Roi Econotrol, a simplified, automatic, speed-pressure governor, makes its first general appearance in the Airmasters. Operator safety and convenience has been stressed throughout the construction and design. Totalizing hour meters, centralized controls, guarded moving parts, high-thermal-efficiency manifolds, all-steel inter-cooler-radiator construction, and engineered air flow to, through, and around the machine, aid in accomplishing this.

Le Roi will supply *CONTRACTORS AND ENGINEERS MONTHLY* readers with further details on mention of this notice.

Copper Alloys, Welding Techniques Described

An addition to the welder's bookshelf, "Welding and Brazing of Copper and Copper Alloys", has just been published by C. E. Phillips & Co. Designed to serve as a handbook of procedures and materials, the 32-page booklet is free to readers of *CONTRACTORS AND ENGINEERS MONTHLY* on request.

Background information on the characteristics of the various copper alloys and on their use, as well as much other data, appears in the pamphlet. Photomicrographs and drawings are used throughout to illustrate both the preparation of the joint and the finished weld.

To secure your copy of this booklet write C. E. Phillips & Co. at 2750 Poplar St., Detroit 8, Mich., mentioning this notice.

Valve Firm in New Plant

The Durabla Mfg. Co. has announced the removal of its valve plant from Berwyn to Wayne, Pa. The firm makes valve units for reciprocating pumps, diesel engines, and compressors, as well as sheet packing and gaskets. The new plant includes developmental facilities in addition to those for production. Durabla has its main offices in New York City, and branches in Chicago, Pittsburgh, Houston, and Toronto.

AGC Surveys Problems At Recent Convention

(Continued from preceding page)

ported on legislation, and D. W. Kimball on public relations.

Recognition was tendered the role of safety in construction with the presentation of various awards for accident prevention. G. O. Griffin of the Dravo Corp. presented trophies to the following firms for their safety records—Highway Division: Herbert Reese, Greenbush, Minn.; Heavy Construction: Newbery Electric Corp., Los Angeles; and in the Building Division, W. D. Berry, St. Petersburg, Fla.

Runners-up for the various divisions included Geo. K. Werner & Sons, Clay Center, Nebr., and A. J. Baltes, Inc., Norwalk, Ohio, in the Highway Division; the Fluor Corp., Los Angeles, and the Ferry Construction Co., Atlantic City, in Heavy Construction; J. J. Wuellner & Son, Alton, Ill., and J. A. Utley, Detroit, in Building.

In the New England contest, E. J. Cross Co. of Worcester won, trailed by James M. Pafford, Falmouth, and the H. P. Cummings Construction Co., Ware. Certificates for no-lost-time accidents were given Walter L. Fauber, Ashland, Ohio; George K. Werner & Sons; the Ferry Construction Co.; F. A. Heckendorf, Littleton, Colo., and others. The "Constructionizing" Award, for the most notable achievement of the

year in promoting the organization, went to E. C. L. Wagner, Manager of the Missouri Branch, for his work in the Construction Council of Missouri. Membership-promotion laurels were won by the Dallas Chapter. Charters were presented the Master Builders of Iowa and the Southern Illinois Builders' Association.

Buy U. S. Savings Bonds.

HUMDINGER

WRITE FOR
NEW CATALOG No. 4503

DIAPHRAGM PUMPS

VALVES NEVER WEAR OUT

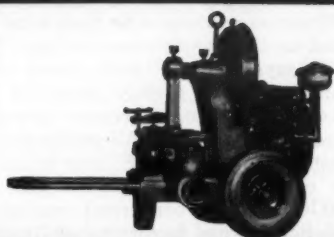
NO TROUGHS, NO SPLASH,

NO PUDDLES, NON-CLOGGING

SIZES: 3" SINGLE, 4" SINGLE, 4" DOUBLE

RALPH B. CARTER COMPANY

HACKENSACK, NEW JERSEY

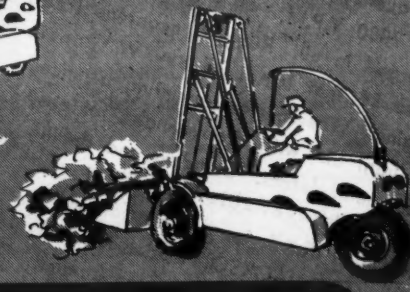
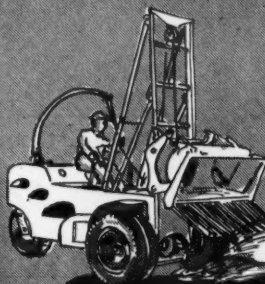
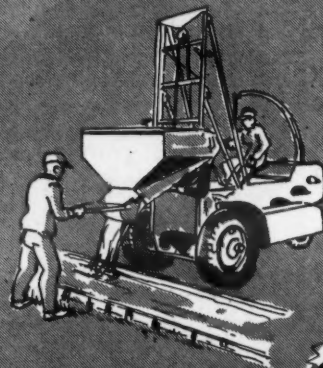
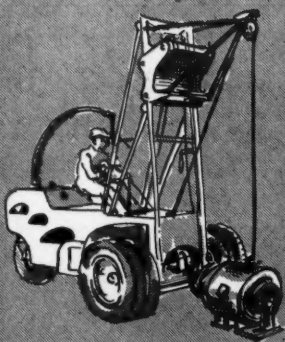
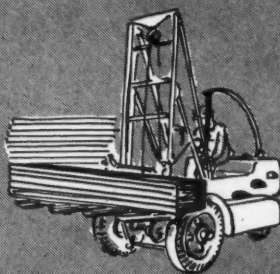
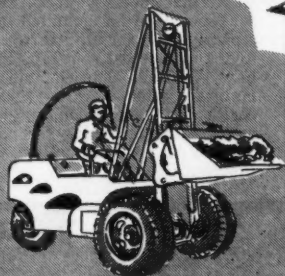


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"ONE MAN BAND"



SCOOPMOBILE's versatility means it can be on the job all day long... it never need sit idle because it won't handle the moving or lifting job to be done. SCOOPMOBILE economically handles any type materials, dirt, cement, lumber, coal, rock, heavy equipment, manure, hay, grain and feed. It scoops, spreads, lifts, dumps, pours, loads, stacks.

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No German Road Work Expected for Long Time

Lack of equipment and material constitutes the greatest problem to be faced in the rehabilitation of Germany's highways, railroads, and airports, it was revealed in a recent interview with Clifford S. Strike, President of F. H. McGraw & Co., engineers and constructors. The New York contractor returned recently from Germany where he had served for almost a year as Chief of the Building Materials, Construction, and Forestry Office of the Military Government for Germany (U. S.).

Whatever work is to be done must be based on Germany's own economy, Mr. Strike says, and as a result, heavy construction will be greatly restricted for a long time to come because of many more pressing needs. All public works construction in the U. S. zone is under the control of the Army Engineers, AMGOT being concerned primarily with housing and factory rehabilitation. Mr. Strike's office, however, supervised

the production of raw materials for AMGOT's needs, as well as the Army's.

Military necessity, rather than civilian demand, governs the work of the Engineer Corps. However, the building it has done and is doing on Germany's network of roads and railroads will more than suffice, Mr. Strike feels, for the nation's civilian needs of many years to come. The Autobahn system itself was not too badly affected by the "dogs of war", but virtually every bridge on it was demolished or badly damaged, either by our air force and artillery, or by the retreating Wehrmacht, he reports.

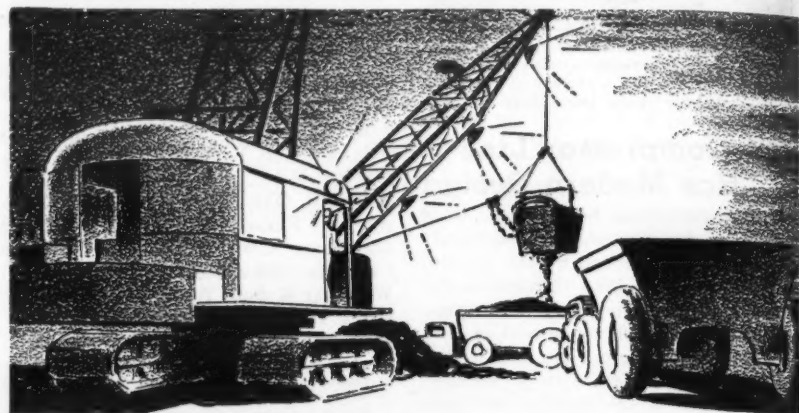
While the war was still in progress, our Engineers improvised many structures in order to push forward the victorious attack. Since peace, German labor has been used to continue this work, in order to maintain security transportation needs. A huge airport planned for Munich has been shelved, however, principally because of Germany's inability to supply materials.

Machinery for road work is almost

nonexistent, having been pressed into service by the retreating Nazis and by our advancing armies. Contractors who have attempted to organize work have found still another problem—labor. Though the nation is filled with unemployed and displaced persons, few workers can be found for building—all prefer farm duties, where the chances for a meal are much better.

Comparing conditions in France with those in Germany, Mr. Strike concludes

that the former is, at the moment, better off than the occupied nation insofar as roads and railroads are concerned. This he attributes to the work done by the American and British armies in order to maintain their supply lines during the final days of the war. Since V-E Day, such work has ceased, however, and now France must do her own building. In Germany, reconstruction in accordance with military needs still goes on.

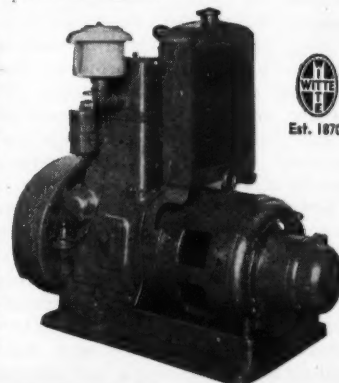


Daytime Visibility for Nighttime Jobs!

● Lighting worries on dragline operations are banished for contractors whose equipment includes one or more WITTE Dieselectric Plants. Compactly built to fit inside cab, they're full Diesels, starting and operating on same low-cost fuel as main Diesel engine.

WITTE DIESELECTRIC PLANTS

Now in mass production, providing new savings on initial purchase price, there's a size and type of WITTE Dieselectric Plant that meets your special needs. Safe for operation in confined places they are sturdily built for uninterrupted performance under the most rugged conditions. See how WITTE Dieselectric can help you maintain your working schedules day and night, and keep on making money for you years after returning its cost. Sizes 3 to 10 KVA. Write today for descriptive literature.



WITTE ENGINE WORKS

DIVISION OF OIL WELL SUPPLY COMPANY UNITED STATES STEEL CORPORATION SUBSIDIARY
LARGEST BUILDER OF SMALL DIESELS KANSAS CITY 2, MO. U.S.A. CABLE WITTEKCMO

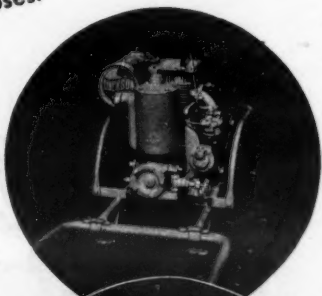
The JACKSON Hydraulic CONCRETE VIBRATOR

for those
24 HOUR DAYS OF CONTINUOUS SERVICE



Thoroughly proved the most dependable and efficient vibrator in its class on practically every major wartime project. Now newly streamlined for even greater convenience and efficiency, the JACKSON Model HS-A1 is by long odds the best buy for general, all-around concrete construction purposes.

Vibrator head driven by hydraulic motor. Standard head 23 1/4" x 21". Vibratory frequency instantly adjustable from 3000 to 7000 V.P.M. All moving parts submerged in oil. Rugged, neoprene lined hose 34 feet long. Husky Wisconsin engine. Wheelbarrow mounting balanced for light lift, with drop handles for easy hose manipulation. Grinding and drilling attachments available. See it at your JACKSON distributor or write for further details. Other JACKSON models to ideally suit every concrete vibratory requirement.



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LUDINGTON MICHIGAN

Specify THE BARROW THAT IS FORTIFIED BY A CONTINUOUS ONE-PIECE FRAME



**Sterling's
TUBULAR
FRAME**

STERLING'S Tubular Frame is a continuous, one-piece, reinforced steel tube made to take the stress and strain of tough, everyday hauling jobs. It assures a long, useful life for your STERLING Barrow. All parts are rigidly braced and supported to withstand hard usage. Specify this better barrow for your next job. While the material situation is still retarding deliveries, you can rest assured we'll ship as promptly as possible.

STERLING WHEELBARROW CO., Milwaukee 14, Wis.

Sterling
WHEELBARROWS



Look for this Mark of
STERLING Quality



Part of the tractor-scraper fleet used by the grading subcontractors to handle the dirt-moving for plant site and roads for the new Deere tractor plant in Iowa.

New Deere Plant Site, Access Roads Graded

The construction of a new Deere & Co. tractor plant near Dubuque, Iowa, necessitates building access roads to reach the new plant, located in the Peru Bottoms of the Mississippi River, about 2½ miles north of the city.

Two modern concrete roads are being built to the plant from U. S. 52 and a nearby county highway, one from the south, the other from the west. The work is being carried on by Nelson, Mullen & Nelson, Inc., of Minneapolis, and the A. B. Lynch Construction Co. of Milwaukee. On one stretch of 1.56 miles, approximately 230,000 cubic yards of earth is being moved. The average haul with tractors and scrapers is 1,800 feet.

Grading for the site of the plant, done by the same outfits, involved moving 300,000 cubic yards of earth. This work included the preparation of railroad spurs, tracks, basement excavation, and plant roads. It was necessary to make cuts of only about 25 feet and fills of 5 to 6 feet in leveling off the site.

The contract for designing and constructing the project is held by Day & Zimmerman, Inc., of Philadelphia, which subcontracted the grading and road work to the mid-western firms. E. L. Knight is General Superintendent.

Small Parts Cleaned In Steam Degreaser

For cleaning small parts in shops and garages, the Detrex Corp. has added a new 2-dip immersion-vapor degreaser to its line of cleaning equipment. Operating on a conveyor basis, the machine offers a choice of several cleaning cycles for removing various types of dirt and grease. The units have hourly work-load capacities of 2,000 to 4,000 pounds.

Detrex's new cleaner, the 500-C-1, is fabricated from 10-gage steel plate reinforced with all-welded structural steel. A water-jacket condenser, tested for a working pressure of 40 pounds per square inch, completely circles the machine. Work to be cleaned is loaded at one end of the degreaser; it travels through the cleaning cycle and returns to the same end for unloading. Sprockets that are below the water line, cross rods, and the entire conveyor chain are zinc-plated. Eight different sizes of baskets, ranging from 8 x 18 x 6 inches to 18 x 36 x 12 inches, are used in the various degreasers of the 500-C-1 line.

Maintenance men can obtain more complete details by writing the Detrex Corp., 13013 Hillview Ave., Detroit 27, Mich.

The Corrosion of Steels

The most important item in obtaining good protection of metal by paint or any other coating is not the precise composition of the metal but the proper preparation of the surface before its coating is applied, a study of steel corrosion, just issued by the United States Steel Corp., points out. Prime coats that contain an inhibitive pigment are advantageous, but will not make up for lack of care in preparing the metal.

The study, published as a 16-page pamphlet, discusses corrosion, compares the corrosion resistance of various steels, including Cor-Ten, and the non-metallic coating of steel as a corrosion preventive. Corrosion is by no means a single problem, the work points out. Rather it comprises a multitude of problems, each of which needs to be separately investigated.

Copies of the report, "Corrosion of Steels", can be obtained by contractors and highway department officials from the Carnegie-Illinois Steel Corp., a U. S. Steel subsidiary. Direct requests to the firm at 434 Fifth Ave., Pittsburgh 19, Pa., and mention this magazine.

Dozer-Shovel Bulletin

The versatility of the Bucyrus-Erie Dozer-Shovel is graphically portrayed in a new 24-page bulletin issued by the manufacturer. Actual operations on a wide variety of digging, earth-moving, and materials-handling jobs are shown in photographs. Special sections are devoted to illustrating the low overhead clearance and compact design, maneuverability, visibility, hydraulic control, balance, and other features of the Dozer-Shovel. The unit is built for use with International TracTracTors.

Copies of the bulletin may be obtained on mention of this notice. Address your requests to Bucyrus-Erie Co., South Milwaukee, Wis.

Improving America's Highways

Estimated Cost of Planned Projects, March 1 (State and Federal-state highway programs in the U.S., Hawaii, and Puerto Rico)

Plans Ready.....	\$354,467,000
Rural road work.....	\$654,630,000
Urban road work.....	199,837,000
Plans in the Making.....	\$2,663,000,000
Rural road work.....	\$1,699,164,000
Urban road work.....	963,920,000

January-February Contract Awards

Total Contracts Awarded.....	503
*Federal-Aid work.....	299
Non-F-A Work.....	204
Total Value.....	\$54,600,000
F-A work.....	\$47,653,500
Non-F-A Work.....	6,946,500

(*Improving 1,567 miles of roads.)

Status of Federal-Aid Projects (March, 1946)

Projects under construction.....	1,666
Projects awarded, not yet begun.....	376
Projects approved for letting.....	1,330

Value of work under way.....	\$208,954,000
Value of work not begun.....	44,717,000
Value of work approved (est.).....	169,746,000

(*Improvements to 2,818 miles, including 756 bridges.)

(All data from Public Roads Administration)

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KEEPING up with a dual drum paver plus a 27E from the same batcher is high production by anyone's standard. It's no stunt performance but a regular day-in, day-out procedure for a Butler Weigh Batchers equipped with Selective Beam Control.

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To study in detail the reasons why Butler Weigh Batchers offer more in instant control, faster production, split-hair accuracy and years of dependability,—write for Bulletin 150E.

Towns and Counties Plan Much Road Work

Highway projects outlined by 55 towns and 38 counties have received the approval of the Public Works Planning Commission of New York State to date. Plans have already been approved for work which will cost the towns about \$2,660,000, and the counties more than \$32,300,000. These plans are for 29 town-sponsored projects, and 521 under county auspices.

The state's 84,000-mile highway system includes 53,309 miles under town control, 17,000 in the county systems, and 14,500 miles of state highways. More than 30,000 of the township mileage has been improved.

During 1945, New York's counties built 24.11 miles of new highways, and reconstructed 124.52 more at a total cost of \$1,229,533.40. Maintenance of highways cost the counties \$8,349,575.83 during the year. Over 382 miles of new improved highways were built, and 189.92 miles reconstructed by the towns

in 1945. Together with maintenance, this work cost the townships \$18,741,070.44, of which about \$3,000,000 was contributed by the State.

The problems of the towns and counties parallel those of the State where highway work is concerned, B. D. Tallamy, Deputy Superintendent of Public Works, told a recent meeting of town highway superintendents. He urged the adoption of design standards, and described activities of the State Department of Public Works in this respect. Factors to be considered in highway planning, as outlined by Mr. Tallamy, include regional needs, type and volume of traffic to be carried, terrain, subsurface conditions, grades, alignments, safe sight distances, and drainage.

Drainage-Study Reprint

Road and airport drainage, always an important subject, comes in for some extensive discussion in a new 8-page pamphlet issued by Armco Drainage &

Metal Products, Inc. The booklet, "Mistakes in Drainage . . . and What Makes a Subdrain", comprises a reprint of two articles by the late H. E. Cotton, the firm's Drainage Engineer, which appeared in recent issues of *The Highway Magazine*. Copies are available upon mention of this item. Address your requests to Armco Drainage & Metal Products, Inc., 785 Curtis St., Middletown, Ohio.

Expand Peoria Plant

The Caterpillar Tractor Co. is adding six new buildings to its Peoria plant, as part of the largest expansion program in the firm's history. The construction program, which will add about 41 acres of floor space and enlarge the floor area by nearly 50 per cent, includes a new diesel engine factory to which all engine-manufacturing operations will be transferred. Scheduled for completion in 1948, the expansion will permit increased production by the end of this year.

Fulton Rejoins Athey

A. W. Fulton has rejoined the sales staff of the Athey Products Corp., Chicago, after a 3-year period of duty with the Navy. Mr. Fulton spent 14 months in the Solomon Islands and, upon his return to this country, supervised maintenance and repair of all construction machinery and automotive equipment at the Lake City Naval Air Station.

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DON'T SKIMP!



A new Willys Jeep, owned by Rodney Walker, Los Angeles contractor, is equipped with a blade for dirt-moving on terrain marked by steep grades.

Modern River-Taming Studied by Egyptian

From the land of the muddy Nile, where irrigation was born, across the seas to our own West, Aly Fadel has come to study the modern aspects of a science founded by his forefathers back almost before time began.

Mr. Fadel is a young Egyptian engineer devoted to combating the twin menaces of drought and flood—long enemies of his people. Here in the United States, under the auspices of his own Government, the International Training Administration, and our Bureau of Reclamation, he plans to study 20th-century dam-building and irrigation methods.

To be sure, Egypt has modern irrigation these days, herself. But not on such a scale as the Colossus of the West. Assuan, her major dam on the Nile, rises only 144 feet, compared to towering 726-foot Boulder Dam on the Colorado. The Egyptian structure contains 1,400,000 cubic yards of material, in contrast to the 10,000,000 cubic yards that went into mighty Grand Coulee.

In Egypt, Mr. Fadel's neighbors still use such devices as the "shadoof" for bailing water from the river to the fields, and the ox-powered "sakia" or water wheel—both almost as ageless as the Land of the Pharaohs itself.

Though the inhabitants along the Nile have constructed low dams or barrages in the river for centuries, such projects were designed only to divert water to the fields during flood season. Storing

water for the dry spells, or penning it up in order to produce electric energy, has been done only in recent years. However, Egypt is stirring with new life

these days—possibly a reincarnation of the ancient engineering spirit is responsible—and men like Aly Fadel hope to see her come of age in modern developments.

The knowledge of how Americans have harnessed the torrent and overcome the dust will be used by the young engineer to electrify his homeland, and to expand the Nile's living "green strip" farther into the desert. Except for a few scattered oases, the Nile banks are the only verdant areas in a land that is fourteen-fifteenths desert.

Mr. Fadel recently completed two weeks of orientation at Washington, and will study under Chief Reclamation Engineer Walker R. Young at Denver, before joining field crews on projects being surveyed or under construction. He has shown special interest in engineering geology, and will devote much time to subsurface exploration work on dam foundations, and to the diamond-drilling process whereby the nature and weight-carrying properties of underlying rock are determined.

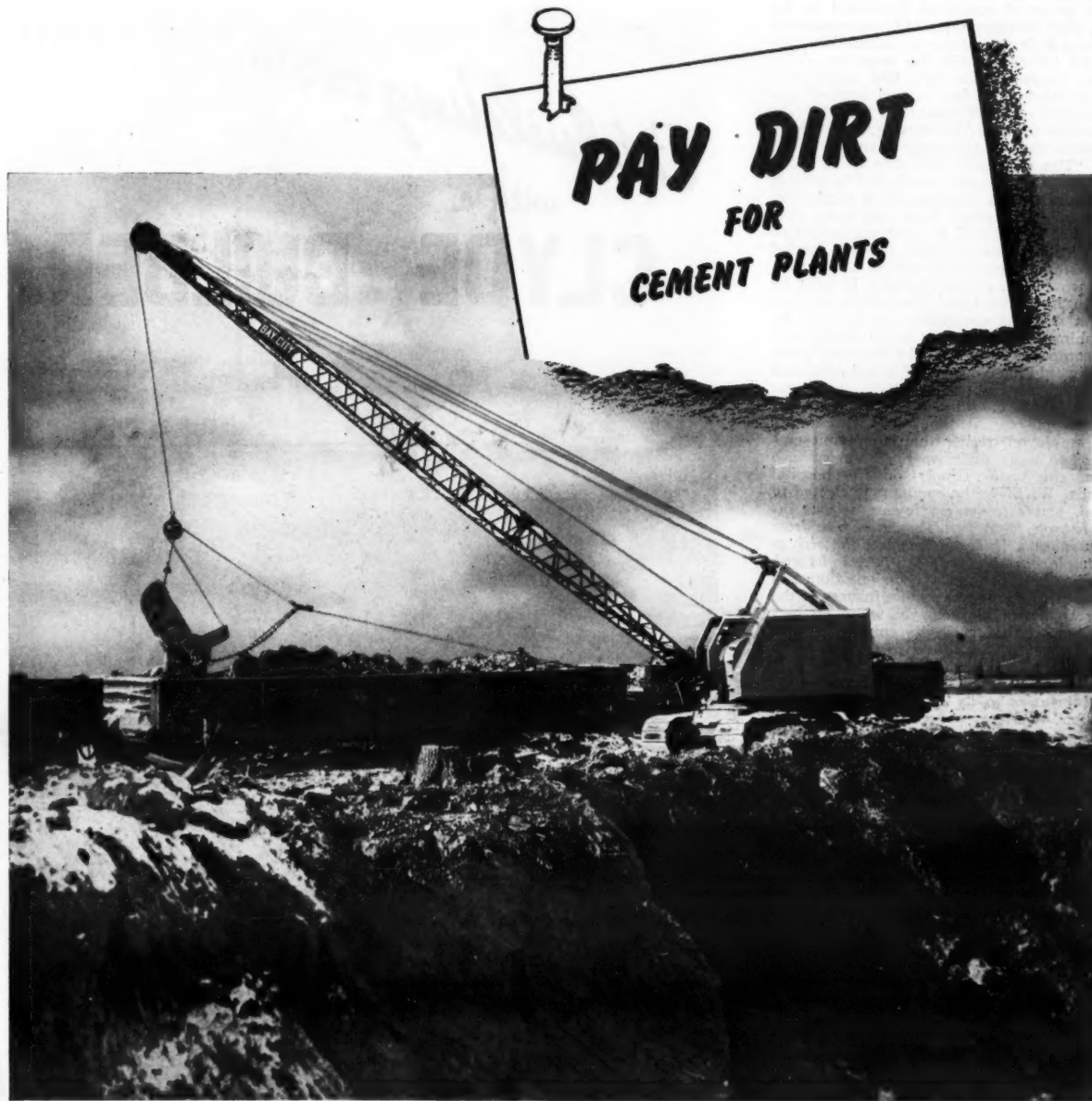
"East is East, and West is West", but the twain can get together for the brotherly betterment of humanity, in a science founded by one and developed to its high point by the other.

Plastic Slide Rules

Made in Pocket-Sizes

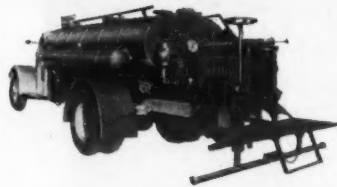
Pocket slide rules, practically a necessity for handy, rapid calculating, are now available from the Charles Bruning Co. Made in 5-inch size, the rule has the A, B, CI, C, D, K, S, L, and T scales for wide-range service. It is all-plastic in construction, has precision graduations, and a firmly enclosed glass indicator, Bruning says. Graduated scales in both centimeters and inches mark the rule's bevel edges.

This slide rule, and other Bruning pocket equipment for engineers and draftsmen, is described in literature available from the firm to readers of this magazine. Write the Charles Bruning Co., Inc., 4754 Montrose Ave., Chicago 41, Ill., and mention this report.



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Avoid Legal Pitfalls

Edited by A. L. H. STREET, Attorney-at-Law

These brief abstracts of court decisions may aid you. Local ordinances or state laws may alter conditions in your community. If in doubt consult your own attorney.

Pure Drinking Water for Workmen Is the Contractor's Responsibility

Why an employer should be held legally accountable to his workers for injurious results from contaminated water which he furnished them has been explained in a decision rendered by the Illinois Supreme Court (Permanent Construction Co. v. Industrial Commission, 380 Ill. 47, 43 N. E. 2d, 557). In that decision the court upheld awards against the construction company, under the Illinois Workmen's Compensation Act, on account of typhoid fever that was contracted by two employees through drinking water furnished them by the company during a construction job on state-hospital grounds. The water was taken from an institutional water system that supplied the hospital. There was no claim that the buckets in which the water was carried to the men contaminated the water; admittedly the contamination was in the water itself.

The principal questions presented to the court were whether typhoid fever contracted under such circumstances constituted an "accidental injury" within the meaning of the Illinois Compensation Act, and whether it was so related to the injured parties' circumstances of employment as to bring the case within the Act. The court answered these questions in the affirmative, and said, in part: "The employer, probably to conserve the time of its employees, elected to furnish water for drinking purposes to its employees. It obtained the water from the water system, . . . transferred it from the mains of that water system to buckets, and carried it to its employees at the places where they were working. . . . By so doing it must be said to have furnished the water in connection with its employees' work. . . . By furnishing drinking water to its employees" (the company) "put itself in the same position it would have been in if it had furnished the water from its own wells. . . . It was to its advantage to furnish drinking water to its employees at the place where they were employed, rather than to permit employees to leave their work . . . to go to a tap of the water supply on the hospital grounds. WHEN" (the company) "elected to furnish water to its employees, it was incumbent on it to furnish water free from contamination. Under these facts the risk to its employees became a special hazard. Though the Workmen's Compensation Act does not make an employer an insurer of the safety of his employees, yet when an employer elects to furnish its employees with drinking water, it is bound to see and know that the water furnished is free from deleterious substances, liable to cause accidental injuries to its employees."

Similar decisions were reached by the Maine Supreme Judicial Court, which awarded compensation to an employee of a state highway commission on account of typhoid fever contracted by him from drinking contaminated water. The water was taken from brooks and a spring, and was furnished to men who were lodged and boarded in a road camp. (Brodin's Case, 124 Maine 162, 126 Atl. 829.)

The courts of other states have rendered decisions to the same effect. On the other hand, the Minnesota Supreme Court and some other appellate courts have decided that such results of drinking contaminated water cannot be regarded as "accidental injuries", within the meaning of compensation acts.

Duty to Test Water

One of the latest decisions bearing on this subject was rendered by the Maryland Court of Appeals, October 29, 1942, in the case of Union Mining Co. v. Blank, 28 Atl. 2d, 568. There, injury to a worker in a brick-manufacturing plant resulted from contaminated drinking water furnished by the employer from a spring. The court decided that it was an "accidental injury" within the Maryland Workmen's Compensation Act; so it was not vital to determine whether the employer was negligent or not. But the court said: "It is true that employers who undertake to furnish water for employees are bound to take reasonable precautions to see that such water is free from germs and dangerous impurities. . . . Just what precautions should be taken depend upon the facts in each particular case. Where the water is part of a city water supply which is regularly tested, it would not ordinarily be necessary for the employer to test the water again, although he should see that the means by which it is brought to his employees are kept uncontaminated. Where the water is brought from a well or spring, the exercise of ordinary care would indicate that it should be regularly tested. This is so, even though it comes from a well, such as the

one in the case before us, which has been used with apparent immunity by the community for one hundred years."

The opinion in the Maryland case will be found to contain references to practically all of the previously rendered appellate court decisions bearing on this subject.

Where illness or other injury of an employee, caused by contaminated water furnished him by his employer, is not compensable under a local workmen's compensation act, it would seem fairly clear that the employer may be held liable for damages, in a common-law action, on its being proved that the employer was negligent.

(Concluded on next page)

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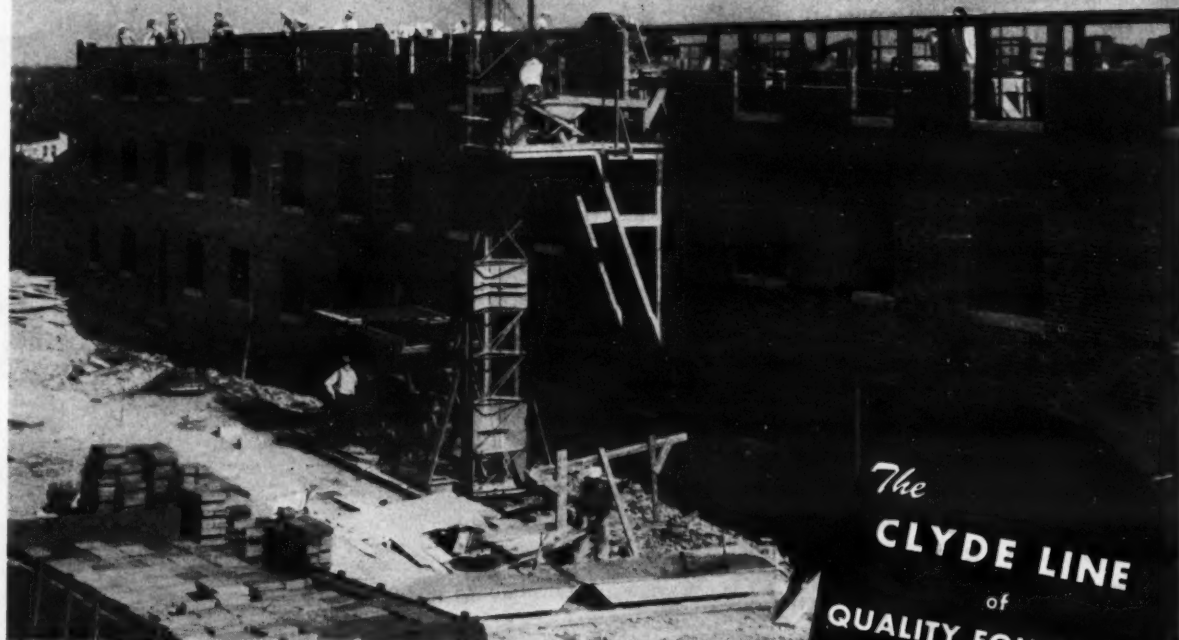
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Avoid Legal Pitfalls

(Continued from preceding page)

Care Required as to Containers

Our attention has been drawn to only one case where such common-law liability was involved, but the decision in that case provides strong support for the theory of an employer's liability for the container in which water has become contaminated. In that case (*Geller v. Briscoe Mfg. Co.*, 136 Mich. 330, 99 N. W. 281) the plaintiff was seriously injured through drinking a mixture of potash and water which had been placed in a water cooler to cleanse it. (The accident seems to have occurred before there was any local workmen's compensation act. Obviously, if the courts labeled typhoid fever caused by contaminated water an "accidental injury", there would be even stronger reason for their regarding the results of an irritant poisoning as such an injury.) The Michigan Supreme Court said, in part: "These facts warrant the inference that defendant did not furnish a reasonably safe receptacle for drinking water to be used by its employees, and we think it may also be inferred that due care on its part would have made it safe. If defendant had furnished in the first instance a reasonably safe water cooler, its obligation to use due care to see that it did not become unsafe through use is a question not involved in this suit. We think it clear, however, that defendant was bound to use due care that the water cooler furnished for the use of its employees should in the first instance be reasonably safe for use, and that it was chargeable with the negligence of any subordinate to whom it delegated this duty."

It is to be remembered that it is almost as important to avoid litigation as it is to win it. Pursuit of this policy suggests that it is worth while for contractors to use the utmost care all along the line—from the choice of water supply to the utensils from which the employees drink—to avoid furnishing contaminated water to their workmen.

Increased Labor Costs Hit Contractors Hard

If anyone doubts that a contractor may sometimes find himself between the devil and the deep blue sea, let him list to what happened to the contractor and subcontractors on a Federal public works job awarded in 1935, and forming the basis of litigation decided by the United States Court of Claims, January 7, 1946.

The contract specified schedules of wages that must be paid to men engaged on the job. These rates were subject to change by the Public Works Administrator, as well as any consequent change in the prime contract and subcontract price. There was also a clause that the Government would not entertain claims for additional compensation based on wages paid in excess of the contract schedules.

Men left the job when the contractor and

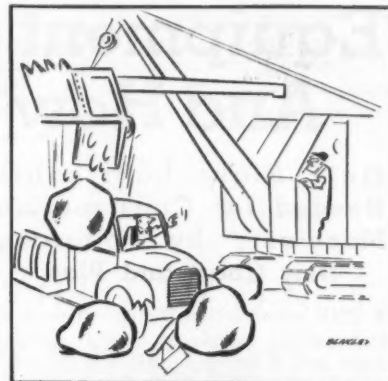
subcontractors refused to boost their pay above the scheduled rates. The Government refused to raise the contract price, but the contractor and subcontractors gave in to the unions and the work went ahead. A second demand for increased wages was met, and later the contractor filed claims with the Government for reimbursement, for itself and the subcontractors, on account of the resulting increased labor cost. The Court of Claims was called upon to review the action of the Federal authorities in refusing to increase the contract price. The court said, after referring to a decision of the United States Supreme Court in which recovery was denied in a case of a similar nature:

"We are not unmindful of the hardships with which plaintiff and its subcontractors were faced. They entered into the contract in good faith, apparently calculating their bid price in reliance on wage rates set pursuant to the schedules contained in the specifications. It was not their fault that they were compelled to pay higher wages. In the circumstances, they had no other choice in the

matter. On the other hand, it was not the fault of the representatives of the Government who had the responsibility of handling the issues involved in this project. Under the plain terms of the contract and specifications, and in the light of the decision of the Supreme Court, plaintiff cannot recover." (*George A. Fuller Co. v. United States*, 63 Fed. Supp. 768.)

What Is Considered "Reasonable Dispatch"?

An excavating contract required the contractor to "forthwith commence and with reasonable dispatch continue the work". In a suit for recovery of the agreed price, the owner claimed damages for delay in performance, and argued that the trial judge erred in deciding that the delay was excusable, having been caused by such unforeseen accident as the breaking down of a power shovel. The owner contended that the contractor was bound "to have a proper shovel in proper order and proof against the possibility of breaking down". Rejecting that argument and deciding the case in favor of the contractor, the New Jersey Supreme Court said: "The contract does not call for absolute completion at any specified time, but merely requires that plaintiffs shall complete with reasonable dispatch. Such language cannot be construed as imposing more



"No, no, Murphy, back farther and still quite a bit south!"

than diligence in completion." (*Perry v. Lyon Construction Co.*, 145 Atl. 637.)

But, in passing, it is to be remembered that diligence might be deemed to be lacking where a contractor has not used reasonable care and foresight in guarding against equipment being out of order when put to use, by making such inspection of the same as a prudent contractor should make under similar circumstances.

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JOSEPH F. HEIL

To the Earth-moving Industry:

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This logical question vitally concerns our good customers and prospects, at a time when many plans are being made for new projects and for the addition of new equipment.

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We intend in further advertisements in this publication to give you a brief picture of some of the resources behind Heil earth-moving equipment.

Yours very truly,
Joseph F. Heil
President

A partial view of our development engineering department where new advances in speed and performance are born.

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Equipment Greasing And How to Simplify It

Only Eight Lubricants Needed for Construction Machinery by Following New Chart and Plan

THE construction industry has most successfully completed its war assignment and is swinging into a huge post-war program. This is an opportune time for contractors, machinery builders, and oil companies to put into effect a much needed simplification of their lubrication program. This means standardizing on a few well selected general-purpose lubricants. What lubricant to use for a specific purpose, and how and when to use it, is the subject of an article "Construction Machinery" by K. L. Hollister of the Technical and Research Division, The Texas Co., featured in the February issue of *Lubrication*, published by that company. This article is reprinted here.

The construction-machinery manufacturers have already provided excellent lubrication charts, specifying the grades of lubricants which they consider most suitable for their equipment. These charts are extremely useful on a great many installations where the concentration of equipment is such that they can be accurately followed. However, different manufacturers recommend different types or brands of lubricants, and to meet the specialized recommendations shown on their charts for a variety of equipment (such as rock drills, pumps, lighting sets, concrete mixers, scrapers, tractors, pavers, and excavating machines, to mention a few) would require more lubricants than could be conveniently handled. For example, to meet the specialized lubrication recommendations for such equipment on one small road, contract would require five grades of motor oil, four grades of gear oil, three grades of gear and cable lubricant, six greases, a track-roll lubricant, a cylinder oil, and a hydraulic oil—altogether twenty-one different products.

Now, were you ever on a large construction project with sand being whipped up by a 30-mile wind and a completion date just around the corner? Under such conditions you do not give an oiler several different grease cans, several more different oil cans, and a lubricant chart with circles and squares and blue and red lines, and then say, "That unit has got to be back hauling dirt in ten minutes". The contractor's lubrication engineer knows from necessity that the twenty-one lubricants must be cut down to perhaps eight. The chief of the lubricating crew then has the problem of deciding which of the eight lubricants to apply where twenty-one are specified. This is putting responsibility where it does not belong. What the construction industry needs is a lubrication plan carefully worked out in advance so that it will not be necessary to improvise simplification methods in the field.

Eight Lubricants

The purpose of this article is to present a plan for lubricating practically all construction machinery with eight lubricants. Advances in development and manufacturing of lubricants have made this possible. The eight main products are:

SAE 30 heavy-duty engine oil
SAE 90 gear oil
Light mineral oil
General-purpose grease
Wheel-bearing grease
Track-roller lubricant
Open-gear lubricant
Cable lubricant

It is hardly necessary to enumerate the advantages of having only one engine oil, one gear lubricant, and one

grease to apply. Economy, efficiency, and orderliness will take the place of confusion in the handling of lubricants, all the way from the storehouse to final application. Better lubrication of moving parts will result. Theoretically, providing a multitude of special lubricants, each suitable for a particular part, should result in perfect lubrication. But on a large construction project, due to the great variety of equipment, such a plan is unworkable. Confusion is the inevitable outcome of trying to handle a great number of special lubricants. And, inevitably, the lubrication crew will arbitrarily select a few lubricants for all purposes. It is far better to provide this simplification in advance rather than to try to work

(Continued on next page)

Simplified Lubrication Plan for Large Construction Projects

Part Requiring Lubrication	Hot Weather Consistently Above 90 Degrees F	Summer Lowest Expected: Above 32 Degrees F	Mild Winter Lowest Expected: Above 10 Degrees F	Severe Cold Lowest Expected: Below 10 Degrees F
Gasoline and diesel engines	Heavy-duty oil SAE 30	Heavy-duty oil SAE 30	Heavy-duty oil SAE 20	Heavy-duty oil SAE 10
Gear boxes Bearings (severe service) Chain drives Flexible couplings Universal joints Other oil-lubricated parts in heavy-duty service	Gear oil SAE 140	Gear oil SAE 90	Gear oil SAE 90	Gear oil SAE 80
Hydraulic mechanisms Air cleaners Air compressors Bearings (normal service) Electric motors and generators Other oil-lubricated parts in light-duty service	Straight mineral oil SAE 30	Straight mineral oil SAE 20	Straight mineral oil SAE 10	Straight mineral oil SAE 10
Wheel bearings Hand packed-ball and roller bearings	Wheel-bearing grease No. 2	Wheel-bearing grease No. 2	Wheel-bearing grease No. 2	Wheel-bearing grease No. 1
Track rollers and other frequently lubricated bearings working in mud and water	Track-roller lubricant Heavy	Track-roller lubricant Medium	Track-roller lubricant Medium	Track-roller lubricant Light
Other grease fittings	General-purpose grease No. 2	General-purpose grease No. 1	General-purpose grease No. 0	General-purpose grease No. 0
Wire rope and cables	Cable lubricant	Cable lubricant	Cable lubricant	Cable lubricant
Open gears	Open-gear lubricant Heavy	Open-gear lubricant Medium	Open-gear lubricant Light	Cable lubricant

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for any power application is the excellence of perfectly matched equipment available for use with them. Through International Industrial Power distributors you have available the 'dozer blades and other earth-moving tools that are best adapted to the work at your locations.

Thus, you have the best combination for profitable operations: (1) the unbeatable operating economy of power-packed International Crawlers and (2) the finest of time-tested and job-proved equipment, matched in work capacity to the horsepower of International Tractors.

Consider the many superior features of International Diesel TracTractors, such as:

- Instant-starting, full Diesel engines with advanced design fuel injection that assures complete fuel combustion—
- Ball-bearing and roller-bearing power transmissions that deliver maximum engine horsepower to the tracks—
- Accessible and replaceable clutches, brakes, transmission and other assemblies—

Then you know that International Tractors plus the finest of matched equipment makes the best combination for greater profits through peak performance.

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INTERNATIONAL Industrial Power

Equipment Greasing And How to Simplify It

(Continued from preceding page)

it out in the middle of a construction job, often many miles from nowhere and after most of the oils and greases have been purchased.

If only one unit is involved, the number of lubricants is not so important. But on a large project, with a variety of equipment, if a large number of lubricants is supplied, there is a much greater chance of misapplication than if a few carefully selected lubricants are provided.

That a few lubricants will properly take care of all kinds of construction equipment was proved by the Army under the severest possible conditions. The simplified lubrication plan of the Army was carefully worked out in advance with the cooperation of the automotive, construction, and oil industries. It was found, for example, that at normal temperatures, most engines could be lubricated with an SAE 30 and most gears with an SAE 90 oil. This not only simplified things for the maintenance men and the drivers, but provided them with well lubricated machines that functioned smoothly at any temperature, from the Arctic Circle to the tropics, in the sand of the desert as well as in amphibious operations in the Pacific.

In the simplified plan for commercial construction work, the principal lubricants required and their main points of application are listed in the chart on page 60. This is the key to the simplified plan. Its utility is apparent; its simplicity obvious.

The adoption of a simplified lubrication plan does not mean that the present lubrication charts, which have been carefully prepared by the equipment manufacturers, need be revised. Much of the construction machinery goes to operators who can follow the charts exactly and use lubricants specified. For the machine on a large project, however, general recommendations are needed, such as:

Part	Frequency Hours	Lubricant
Oil-lubricated parts	8	SAE 20 oil
Open grease fittings	8	General-purpose grease
Capped grease fittings	48	General-purpose grease
Engine crankcase	48	SAE 30 heavy-duty engine oil
Enclosed gears	960	SAE 90 gear oil

These would be followed by a listing of points where special lubricants or instructions are needed. Such information would be for the experienced lubrication men on large projects where consolidation and simplification of lubricants are necessary.

A typical example, illustrating the application of the simplified plan, is shown in the following chart.

Motorized Road Scraper

Part	Hours Interval	Lubricant
Power unit		
Crankcase	60	Heavy-duty engine oil
Air cleaners	60	Light mineral oil
Generator	300	Light mineral oil
Cranking motor	600	Light mineral oil
Water pump	900	General-purpose grease
Flywheel clutch		
Release bearing	300	General-purpose grease
Pilot bearing	300	Wheel-bearing grease
Disengaging yoke	10	General-purpose grease
Control levers and		
Drawbar pins	10	General-purpose grease
Main case	400	Light mineral oil*
Transmission case	600	Gear oil
Power control unit		
Gear case	900	Gear oil
Brake rollers and		
Control linkage	60	Light mineral oil**
Shaft bearings	10	General-purpose grease
Cable drum bearings	3,000	Wheel-bearing grease
Brake roller		
Shaft bearings	3,000	Wheel-bearing grease
Cable		[Do not lubricate]
Scraper		
Wheel bearings	600	Wheel-bearing grease
Tailgate roller and		
Sheave bearings	10	General-purpose grease
Universal forgings	10	General-purpose grease
Ball and socket hitch	10	General-purpose grease
Hinge pins	10	General-purpose grease
Spring pipe	300	Gear oil
Cables	60	Cable lubricant

*Manufacturer recommends SAE 30 engine oil.
**Manufacturer recommends SAE 10 engine oil.

Use of Lubricants

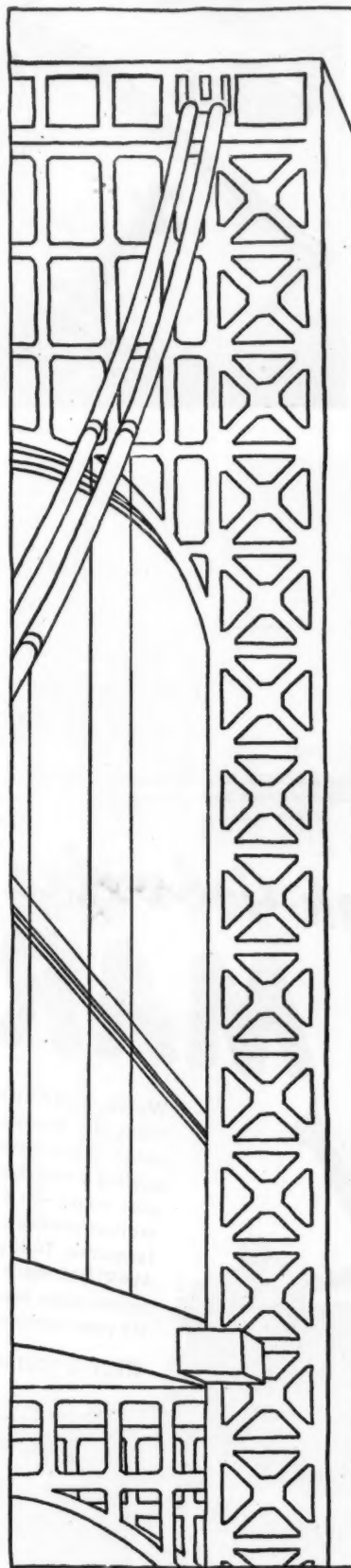
Heavy-Duty Engine Oil: For gasoline and diesel engines, heavy-duty oils have been developed. These are fortified with additives which impart detergent and extreme-pressure characteristics and inhibit oxidation. This results

in cleaner engines, adequate bearing protection, and freedom from scuffing of pistons and cylinders.

It is recommended that the heavy-duty oil be restricted to engine crankcases and a lighter, less expensive, straight mineral oil be adopted for gen-

eral use. For engine crankcases at normal temperatures, manufacturers generally recommend either SAE 20, 30, or 40 oils. Actual tests show little difference in engine performance on the three grades.

(Continued on next page)




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Machinery for cutting grass has been our business for 32 years. Now we present to the highway departments of the country the "Highway Ranger"—designed specifically to meet your varied mowing problems—a gang mowing machine that cuts everything from coarse grass on steep shoulder grades to the turf on clover-leaf centers and island stretches. Use any make of tractor you wish with the "Highway Ranger"—switch from one tractor to another—transport cutting units at highway speeds. For further details write to the Worthington plant in Stroudsburg—or phone your nearest Worthington distributor. They are located in all principal cities.

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KEWANEE, ILLINOIS

Equipment Greasing And How to Simplify It

(Continued from preceding page)

Gear Oil: Many of the different types of gears, such as the ordinary spur or spiral-bevel, where rolling contact occurs between the gear teeth, can be satisfactorily lubricated with a straight mineral oil. However, where there is a sliding contact between the gear-teeth faces, as in hypoid or worm gears, the lubricants should be fortified to prevent scoring under heavy loads. These extreme-pressure lubricants will also take care of slight misalignment or machining imperfections and are, therefore, frequently used for breaking in plain gears. Since a variety of gears is found in construction machinery, extreme-pressure gear oils are recommended, to insure sufficient load-carrying capacity for all types. The additive used to impart this extra load-carrying ability should not cause thickening, corrosion, or sedimentation.

With the addition of an extreme-pressure agent, there is no need for heavier grades to carry severe loads. It is merely necessary to provide a grade which will insure easy starting and at the same time not leak out.

Light Mineral Oil: The consumption of oil for general use, on a large construction project, is considerable. Hydraulic mechanisms and air cleaners especially require a great deal of oil. Since, for most general applications, an oil lighter than that used in the engine is preferred, it appears justified to use a light straight mineral oil wherever oil is required except in engines and gears.

General-Purpose Grease: Greases are available which will withstand not only high temperatures but also the tendency to wash out, even in amphibious operations. By using such a grease, considerable simplification is achieved. With a general-purpose grease it is not necessary to determine whether a particular grease fitting requires a chassis lubricant or a high-temperature grease. The general-purpose grease should be suitable for plain, ball, and roller bearings.

Wheel-Bearing Lubricant: A heavier grease is needed for wheel bearings and hand-packed ball and roller bearings, such as the clutch release and pilot bearings, which are subject to external heat.

Track-Roller Lubricant: Track rollers and other parts of the crawler-type mechanism require a lubricant which will be sufficiently fluid to flow through bearing passages and at the same time be sufficiently non-fluid to prevent leakage from worn bearings. This requires a special semi-fluid lubricant known generally as track-roller lubricant, containing ingredients which impart stringiness to the lubricant.

Open-Gear Lubricant: For open gears, and exposed sliding surfaces such as the dipper sticks of power shovels, a special lubricant should be used having exceptional adhesive and water-resistance qualities. It should be heated to be fluid enough to apply easily with a brush, or by pouring. Upon cooling, it should thicken sufficiently so that it will not drip or be thrown from the cable or gear teeth.

Cable Lubricant: A light adhesive lubricant is needed which will penetrate the individual strands of wire rope and cable and provide protection against rust.

Additional Lubricants: Special-purpose lubricants will still be necessary for certain equipment such as:

Lubricant	Use
Water-pump grease	Shaft-sealed water pumps
Magnetos grease	Magnetos in hot location
Car-journal oil	Waste-packed car journal
Steam-cylinder oil	Steam engines
Form oil	Concrete forms
Rustproof compound	Equipment in storage
Block grease	Open bearings
Rock-drill lubricant	Rock drills

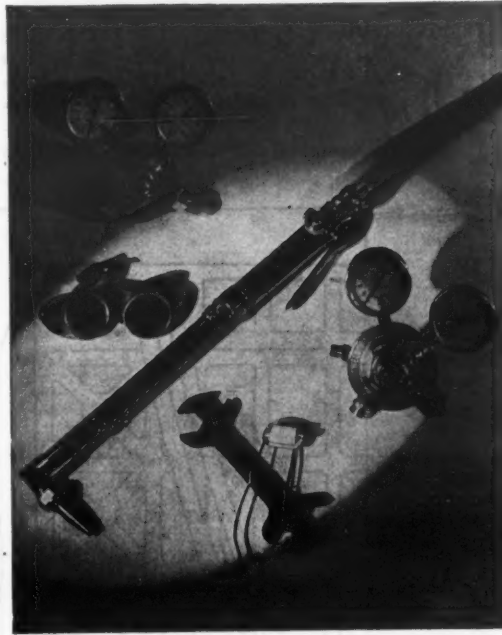
Classification of Oils and Greases

Although oils and greases have many important qualities, from a practical standpoint their resistance to flow is of greatest interest. This is what is referred to when we speak of oils as being "light" or "heavy" and greases as "soft" or "hard". It is important because it controls consumption or leakage, friction or drag, and ease of pumping or handling. Technically the fluidity of an oil is indicated by its "viscosity" and the consistency of a grease by its "penetration".

The SAE classification for automotive oils is by number, according to viscosity: motor oils Nos. 10, 20, 30, 40, 50, 60, or 70; gear oils Nos. 80, 90, 140, or 250. The higher the number in the same series, the more viscous the oil.

Until recently there was no standard grease-numbering system. Now, however, greases are classified uniformly according to penetration by NLGI (National Lubricating Grease Institute): Nos. 1, 2, 3, 4, 5, or 6. Again, the higher

(Continued on next page)



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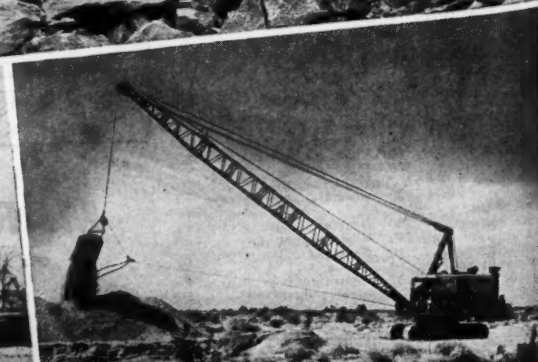
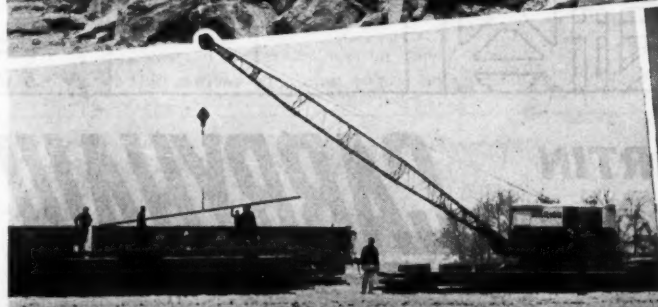
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Equipment Greasing And How to Simplify It

(Continued from preceding page)

the number the harder the grease.

For classification purposes the viscosity and penetration are taken at standard temperatures. Actually, however, when the temperature drops, oils become heavier or thicker and greases become harder or stiffer. It is necessary, therefore, to use lower-number grades for low temperatures and higher-number grades for high temperatures.

To complete any construction work with the least wear and tear of equipment requires not only putting the right lubricants in the right places but also exercising particular care in their application at certain points.

Lubricating Certain Parts

Air Cleaners: Air cleaners may be of the wire-gauze type in which the gauze is either replaced with a new element or washed in kerosene or diesel fuel, dipped in oil, and reused.

The oil-bath-type cleaner requires inspection every 4 to 48 hours to keep the oil at the proper level and the oil cup clean. Every 1,000 hours the entire cleaner should be taken apart and cleaned.

Ball and Roller Bearings: Most ball and roller bearings have seals which prevent leakage of grease. If seals are in good condition, a grease charge should last over 200 hours. Use a low-pressure gun and apply only a few shots unless the bearing is vented. Forcing grease until it shows around the shaft will break the seals. Fill between one-quarter and one-half full.

Brakes: Wheel bearings should not be over-lubricated, or excess lubricant may reach the brakes. Hydraulic brake mechanisms often contain rubber parts. Use only approved fluids.

Cables and Wire Ropes: Cables dragging in dirt should not be lubricated. Cables winding on drums equipped with clutches should be lubricated sparingly, to prevent the possibility of the lubricant reaching the clutch faces. Other cables should be cleaned every 8 hours and cable lubricant applied with a brush. About every 500 hours, cables should be immersed in cable lubricant in a special trough built for this purpose.

Crawler Treads: Do not lubricate.

Chains: In order to lubricate pins of silent chains, the chains should be removed every 50 hours, washed in diesel fuel or kerosene, and soaked in hot gear oil.

Clutch: Do not over-lubricate clutch parts. Lubricant on clutch facings will cause slipping.

Distributors: The lower part of a distributor is often automatically lubricated from the engine. When driven from the generator, however, separate grease lubrication is usually required. The upper distributor bearing may require either grease or oil lubrication. The wick under the distributor cam requires lubrication with light oil. An occasional touch of grease to the cam surfaces is desirable, with the precaution, however, that no lubricant reaches the breaker points.

Engine Crankcase: The drain period recommended by the engine manufacturer covers normal operation. Drain more frequently if oil temperatures are above normal, if the engine is started and stopped often or idled for long periods, if the atmosphere is very dusty, or if the oil has been diluted to facilitate starting. Oil-draining or filter-cleaning periods should be shortened if the filter or oil shows excessive contamination with dirt, metal, fuel, soot, or sludge. Drain oil while hot. If an oil filter is removed when draining oil, add

an extra quantity when refilling the crankcase.

Check the oil level every 8 hours, after the engine has been stopped for a few minutes to allow oil in the upper part of the engine to return to the case.

Contamination of crankcase oil by anti-freeze solutions causes sludging. When adding anti-freeze make sure the cylinder head, oil cooler, and other hold-down bolts are tight, and the gaskets are in good condition.

Fluid Drives: Use only approved fluids as directed.

Fans: Fans mounted on the extension of the shafts of other engine accessories and having no separate bearings require no lubrication. Neither do those having permanently packed bearings. Some fans require occasional grease application, while others must be regularly lubricated with oil. One type of oil-lubricated fan is equipped with an overflow; another is provided with a standpipe to insure the proper oil level. In this latter type the reservoir is filled with oil and the excess drained by turn-

ing the fan until the filler hole is down.

Gears, Enclosed: Check the oil level in gear boxes every 50 hours. In most cases the oil need not be changed except at 1,000-hour intervals. Keep oil seals in good condition to prevent leakage. Foaming or overheating in gear boxes usually indicates too high an oil level. Check drain plugs after heavy rain or severe dust conditions; drain and refill if water is present or if dust

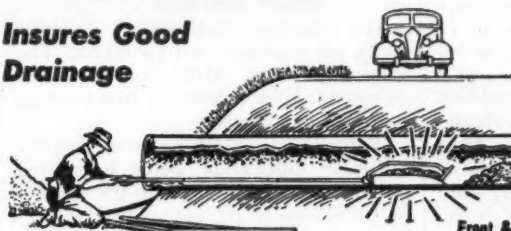
is getting in.

Gears, Open: Open-gear lubricant should be heated so that it can be easily applied with a brush or poured while gears are turning slowly. The grade should be heavy enough so that dripping does not occur when the lubricant has cooled. Gears should be inspected every 8 hours and more lubricant applied if necessary. Gears oper-

(Continued on next page)

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Equipment Greasing And How to Simplify It

(Continued from preceding page)

ating in very dusty locations should be washed frequently with used crankcase oil and no other lubricant applied. The lubricant for planetary and other gears located near clutches should be applied cold and sparingly.

Generators and Motors: Over-lubrication causes deterioration of windings and gum formation on the commutator.

Grease Cups: Tighten until pressure is felt. Keep clean while filling.

Grease Fittings: Wipe fittings before and after applying grease. When a plug has to be removed and a fitting applied, it is an indication that that point should be lubricated only occasionally. Most parts, such as plain bearings, should be lubricated frequently and freely. Add grease until clean grease shows at the point where the old grease is forced out.

Rubber Parts: Petroleum causes natural and some synthetic rubber to deteriorate. Keep tires, fan belt, rubber hose, rubber engine mountings, rubber bushings on radius rods and spring shackles, and cooling-system connections free from fuel, oil, and grease.

Rustproofing: Before being placed in storage, machinery should be thoroughly lubricated. Retouch any places where the paint has worn off. Unpainted exterior surfaces should be coated with rustproof compound. Specially treated engine-preservative oils are available, while some of the heavy-duty engine oils have excellent rustproofing characteristics. One of these should be used for engines, gear boxes, and other enclosed oiling systems, and sealed before storage.

Shock Absorbers: Often contain rubber. Use only approved fluids.

Springs: Lubricate spring leaves sparingly, or they may become over-active. Keep springs coated with grease to protect against rust. A graphite grease is recommended by most spring manufacturers. Coil springs on running gears, such as crawler tension springs, in alternating freezing and thawing weather should be packed with grease to keep freezing mud from hindering spring action.

Steering Gear: The steering-gear housing should be kept filled with gear oil, not only to lubricate the gear sur-

faces, but the bearings and steering shaft. A low-pressure dispensing pump should be used to prevent lubricant being forced up the steering column.

Track Rollers: Track rollers of crawler mechanism require frequent lubrication to prevent dirt and water from working in. Those on shovels, draglines, cranes, etc., should be lubricated every hour when traveling.

Universal Joints: Some universal joints are provided with a fitting for lubrication. The ball-and-trunnion type should not be over-lubricated, or the boot will become filled with lubricant. Some roller-bearing types require disassembly and hand packing by an experienced mechanic.

The propeller-shaft splines, in most cases, are equipped with a fitting. The type of plug or fitting should not be changed, or the balance of this rotating part will be affected.

Water Pump: Some water pumps require no lubrication, being lubricated either automatically from the engine or permanently packed at the factory.

Some water pumps have a wick leading from an oil sump and others have porous bushings through which the oil seeps to the bearings. Those grease-lubricated water pumps in which the grease does not come in contact with the engine coolant (i.e., when the grease is applied to an external support bearing) should be lubricated with general-purpose grease.

Those grease-lubricated water pumps in which the grease does come in contact with the engine coolant (i.e., when the grease is used to lubricate the packing seal) should be lubricated with a stiff waterproof grease.

Wheel Bearings: Front wheel bearings are usually lubricated by removing the hubs and repacking by hand. Rear wheel bearings may require removal. Others are automatically lubricated from the differential or are permanently packed at the factory. Some are equipped with a grease cup or fitting. Still others are equipped with a plug which must be removed while a fitting is substituted, the plug being replaced

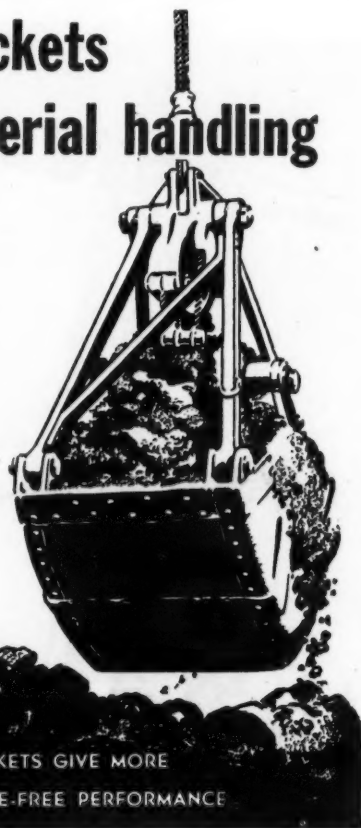
after lubrication.

Whenever wheel bearings are removed for lubrication, the bearings should be examined and washed carefully. Grease is then packed around

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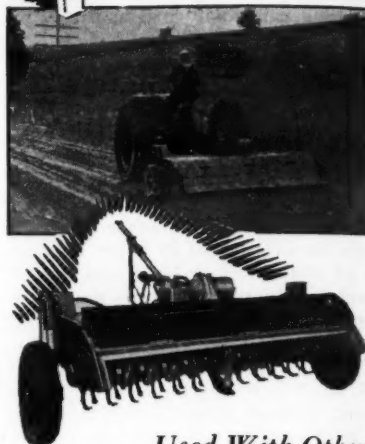
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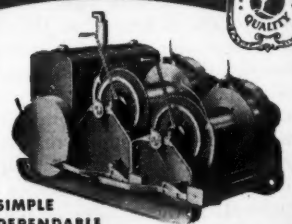
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Sickle blades are quickly and easily sharpened by the new Edgemaster unit of the Pneu-Hydro Road Machinery Co.

New Device Sharpens Dulled Sickle Blades

The practice of allowing dulled sickle blades to accumulate before assigning a man to hand-file them has long been a bugaboo in highway maintenance organizations, says the Pneu-Hydro Road Machinery Co. In an effort to combat this condition and therefore meet a definite highway need, the firm has announced the addition of the Edgemaster sickle-blade sharpener to its line.

The Edgemaster is designed to permit one man to resharpen a garage's complete supply of cutter blades in a brief period of time. Easy to operate, it can be handled by inexperienced hands, the firm says. The unit comprises a frame of pipe and angle iron, a blade holder, and a sharpening blade powered by a 1/4-hp motor. It can be set up in a corner and, if so desired, anchored to a wall.

Heavy-gage steel and 2-inch pipe form the frame. The grinding wheel and motor travel on an overhead monorail. The wheel, capable of a 3,500-rpm speed, is beveled to sharpen two cutting edges at one time. The entire grinding unit swings in a 30-degree arc. The blade is held in alignment on the table by clamping devices. Rocked on a pivot, the table is completely under finger-tip control, and when the operator's touch is removed, automatically drops to avoid accidental contact with the grinding wheel.

Further information on this new device can be obtained by interested maintenance men. Write the Pneu-Hydro Road Machinery Co., Cadillac, Mich., and mention this report.

Acetylene Torch Is Very Light in Weight

Designed to reduce worker fatigue and to step up welding in highway department and contractors' shops, a new Gasweld Featherweight cutting torch is in production by the Wall Chemicals Division of the Liquid Carbonic Corp. Weighing but 2 1/2 pounds, the torch is designed for light metal cutting and occasional heavier work. It measures but 16 inches from tip to butt of handle, and is therefore especially adapted to work in tight spaces. The Gasweld is available with either an 80 or 90-degree forged head. It has a one-piece tellurium copper tip.

For further information on this new Featherweight acetylene torch, write the Liquid Carbonic Corp., 3100 So. Kedzie St., Chicago 23, Ill., and mention this news item.

New Kennametal Offices

The establishment of offices at Pittsburgh, Pa., and Toledo, Ohio, has been announced by Kennametal, Inc., Latrobe, Pa., manufacturer of cutting tools, milling cutters, and wear-resistant parts. The Pittsburgh office, in the American Bank Bldg., is managed by Fred J. Hennig, Jr., assisted by F. R. Dinger. Kennametal activities in western Pennsylvania and West Virginia,

and the offices at Erie, Rochester, and Syracuse will be supervised from Pittsburgh. E. D. Porter has been named Manager at the new Toledo office at 538 No. Erie St.

Honor Given Where Due

All too often we incline to pay tribute to captains of commerce and to super-salesmen as the only men of progress, overlooking those unheralded heroes, the research men and the engineers, who labor behind the scenes to make industry what it is. Tribute is paid these forgotten ones in a 32-page booklet, "Men of Vision", just published by the Caterpillar Tractor Co., Peoria 8, Ill.

The booklet stresses the major role played by scientists and laboratory men in envisioning and converting into reality the many features of the Caterpillar line, since its early pioneering in farm equipment down to the present.

On your request, copies of Form 9282 will be mailed by the firm.

Equipment Greasing And How to Simplify It

(Continued from preceding page)

the bearings, after which they are replaced. Grease seals should be carefully examined and replaced if necessary. Ball bearings must be adjusted so that the wheel will turn freely with no end-play. Only a small amount of

additional grease should be placed in the bearing housing, as over-lubrication may result in grease getting on brakes.

Additional copies of this set of instructions may be obtained by writing The Texas Co., 135 E. 42d St., New York 17, N. Y.

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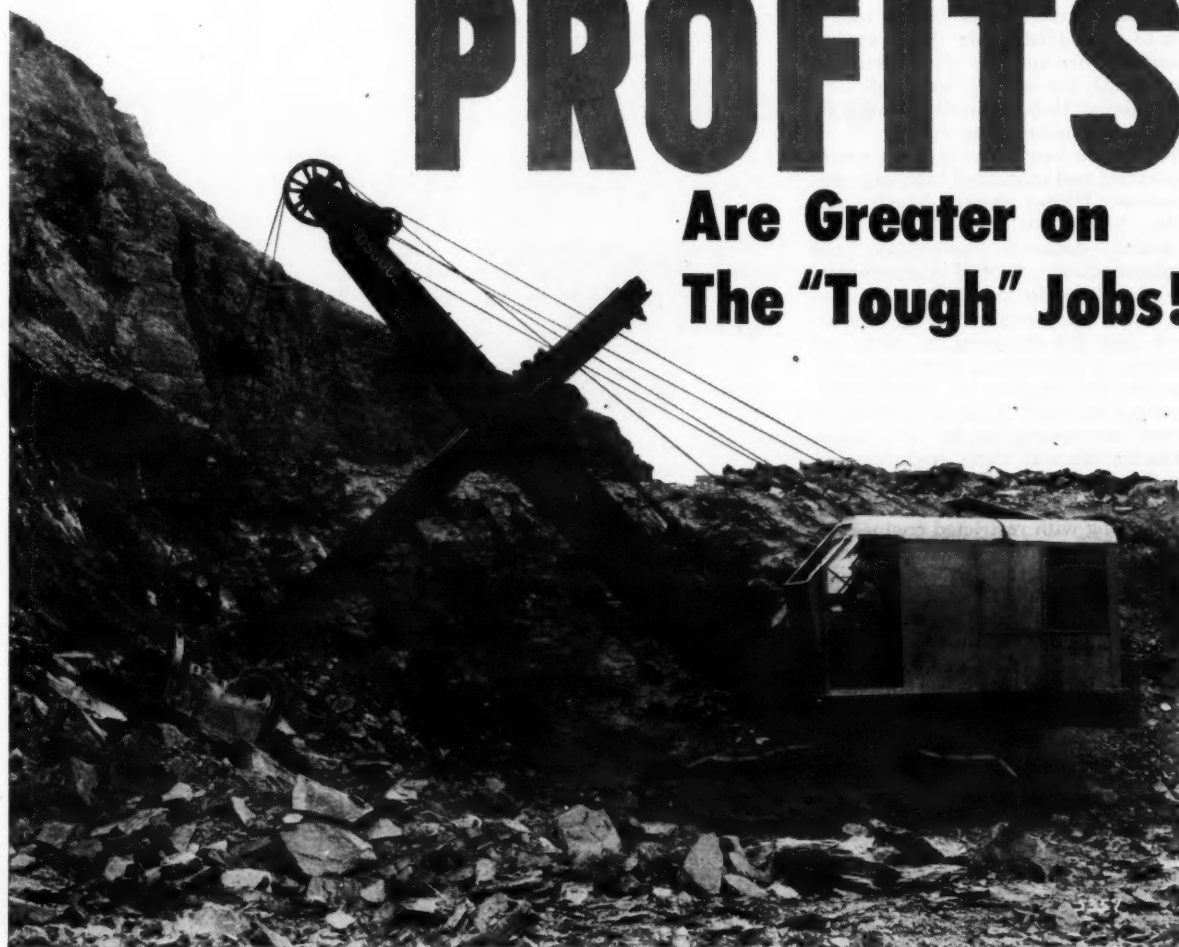
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Engineering Service Needed by Counties

**Trend Towards Full or Part-Time
Employment of Engineers Seen of
Value in County Road Program**

By LEE O. BROOKS, Commissioner, Oakland County, Mich., Road Commission

† COUNTY road commissioners responsible for the construction and maintenance of county highways must provide for competent engineering if the standards of these roads are to be in keeping not only with present-day traffic, but also with ever-expanding future needs. This has been true in the past, and is even more so for the post-war years ahead when we expect the rebuilding of many of our older roads, as well as the improvement of new routes.

An engineer is a sound investment and can save much more than his salary in any county, as all counties that have one know. He has been trained to think, to reason, and to find shortcuts to accomplishments. Many superintendents are capable of constructing good roads, but as they lack engineering training they naturally cannot do the job an engineer can do.

We are no longer living in an era of unplanned and unstudied highway construction. Higher speeds, heavier vehicles, higher maintenance and construction demands necessitate the employment of a trained engineer who can plan what he practices and practice what he plans. Planning means more than the designing of roads and bridges. It also means devising methods for the keeping of records, and planning practical budgets in order to spread the revenue as far as possible.

During the war many engineers engaged in highway work were called into service, and counties found it necessary to get along with restricted engineering assistance. A return to normal conditions requires that county road commissioners must again engage competent technical advisors and engineers. Some of the smaller counties have felt that the expense of a full-time engineer was more than they could afford. These counties have good superintendents who have learned, through experience, proper methods in the maintenance of highways. Part-time engineering services should be available when needed to supplement their work so that designs for new construction are in keeping with good standards.

An efficient county organization is mandatory if highways are to be constructed and maintained with regard for future traffic needs. This, of course, includes engineering services. The County Road Law of Michigan states in part that the Board of County Road Commissioners must employ a registered county highway engineer where the contemplated cost of completed projects is in excess of \$2,000. On such projects, a superintendent who is not a registered engineer cannot perform directly or indirectly the duties imposed upon a county highway engineer.

State Maintenance Contracts

In Michigan, the State Highway Commissioner contracts with a majority of the counties of the state for the maintenance of state trunk lines where such counties have the necessary organizations and competent engineers, including sufficient men and equipment to do the work. More counties each year are taking advantage of these contracts to enlarge their organizations.

Highway construction is performed either under contract or by county forces. In either case the county engineer designs the road and sees that it is built according to plan and specifica-

tions. Federal participation in the construction of secondary or feeder roads in counties also requires preparation of proper plans and supervision of the contract. Counties must measure up to these regulations if advantage is to be taken of Federal Aid.

In the routine work of any county

highway organization many reports must be made to county, state, or Federal agencies. These reports require a thorough knowledge of the subject which can be obtained only by daily contact with the work. County road commissions are judged by their roads. Much of their success can be attributed

to good engineering and the ability to build the kind of highways that the public demands. County road commissioners can see that their roads measure up to these standards by using men who specialize in this type of construction.

From a paper presented at the 31st Annual Michigan Highway Conference at Grand Rapids, Mich., February, 1946.

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**FULLY CONVERTIBLE
MICHIGAN
MOBILE SHOVEL-CRANES**

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6 to 12 TON CRANES

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TRUCK MOBILITY that cuts travel-time, reduces travel-expense between locations. MICHIGAN travels under its own power at 30 MPH speed wherever an ordinary truck can go.

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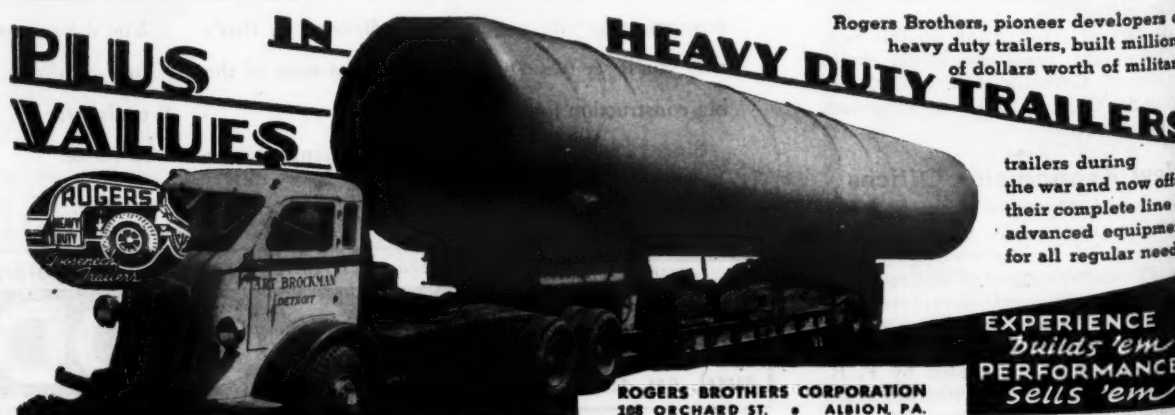
OPERATING EASE that every operator likes and wants. MICHIGAN Fingertip Air Controls minimize fatigue, help maintain high production on every job.

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LONG LIFE that makes MICHIGAN a better-paying investment and results from first-class design, materials and workmanship.

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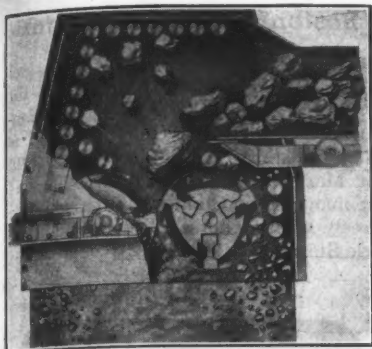


PLUS VALUES IN HEAVY DUTY TRAILERS

Rogers Brothers, pioneer developers of heavy duty trailers, built millions of dollars worth of military trailers during the war and now offer their complete line of advanced equipment for all regular needs.

**EXPERIENCE
Builds 'em
PERFORMANCE
Sells 'em**

ROGERS BROTHERS CORPORATION
106 ORCHARD ST. • ALBION, PA.



The feature of the recently announced New Holland primary crusher is the action of two large impellers, turning in opposite directions, which throw the stone against breaker bars until it is reduced to the proper size.

Impact Crusher Has High Hourly Yield

A new impact primary crusher for quarry and gravel-plant operations has been developed by the New Holland Machine Co., New Holland, Pa. The unit has been reducing 30-inch stone to minus 1-inch on one installation at the rate of 100 tons per hour, with 80 hp.

The New Holland 3030 crusher makes use of two impellers mounted on horizontal shafts. These revolve clockwise and counterclockwise respectively, their tops moving away from each other. Each is 36 inches in diameter and, fitted with three 400-pound manganese steel bars, weighs 3,600 pounds. Rock entering the machine is thrown by the impellers against the breaker bars until it is fine enough to pass around the impellers and through the discharge openings at the bottom. The impeller speed is adjustable from 250 to 1,000 rpm. The four striking faces on the impeller bars can be reversed when worn.

Each impeller is driven separately, through V-belts, by a 40-hp motor. Running at 700 rpm, the 3030 is capable of reducing 40 per cent of run-of-the-quarry stone to minus 3/4-inch, it is reported. A 60 per cent yield is said to be obtainable when running at the recommended speed of 900 rpm.

Readers of CONTRACTORS AND ENGINEERS MONTHLY desirous of more complete details on this new impact crusher should write the manufacturer, mentioning this news item.

New Rex Concrete Mixers

The mechanical details of the mixing action, drive, skip, water system, and other features, and specifications for the two new Rex concrete mixers announced recently by the Chain Belt Co., 1666 West Bruce St., Milwaukee 4, Wis., are shown in a new bulletin issued by the firm. The brochure, No. 481, features the 11-S and 16-S units, and can be secured from the company.

The Role of Worm Gears

The role of worm-gear speed reducers in maintaining production flow during crushing, screening, agitating, and other processing operations is depicted in a folder, "Cleveland's in the Modern Production Flow", just issued by the Cleveland Worm & Gear Co.

Copies of the leaflet can be obtained by addressing the firm at 3277 E. 80th St., Cleveland 4, Ohio. Just mention this news report.

Cleveland Officials Resign

The resignation of George P. Torrence as President and John S. Clark as Vice President and Treasurer of the Cleveland Pneumatic Tool Co., Cleveland, Ohio, has been announced by Walter E. Schott, Chairman of the Board and active executive head of the firm. Lauding the pair's contributions to the firm's war effort, Mr. Schott announced that their posts will not be filled at present.

U. S. Officials Advise India on Road Program

Major General Philip B. Fleming, Federal Works Administrator, and Commissioner Thomas H. MacDonald of the Public Roads Administration, recently visited India to advise that country's Government in connection with a long-range highway-expansion program. They also visited Manila to inspect the development of Philippine highways.

Specialized Automotive Products Are Described

Products for use in the manufacture of trucks, automobiles, engines, and many other applications, are shown in a little booklet just issued by the Eaton Mfg. Co., Cleveland 10, Ohio. In its twelve plants, the firm makes such varied products as specialized truck axles, engine valves and accessories, lubrication and torque-converter pumps, coil and leaf springs, lock wash-

ers, snap rings, cold-drawn steel, castings and stampings, and car and truck heaters. New products developed by the firm include an eddy-current drive

for engines, an electro-magnetic clutch, an anti-friction power screw, and others. The booklet can be obtained on mention of this notice.

WINPOWER

ELECTRIC PLANTS

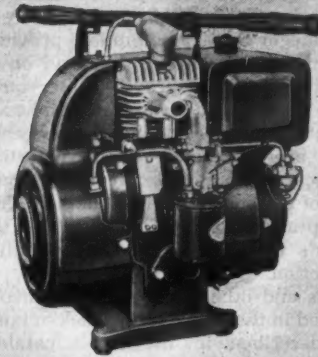
Light, Rugged, Portable
Inexpensive to Operate

Here is the ideal gasoline electric plant for portable work on road and construction jobs, repair shops, fire departments, operating electric tools, and for general lighting. Sizes from 350 to 35,000 watts A.C. and D.C.

Light, compact, heavy-duty engines that deliver dependable power under all conditions. Send for catalog and prices.

Write today for illustrated catalog and prices

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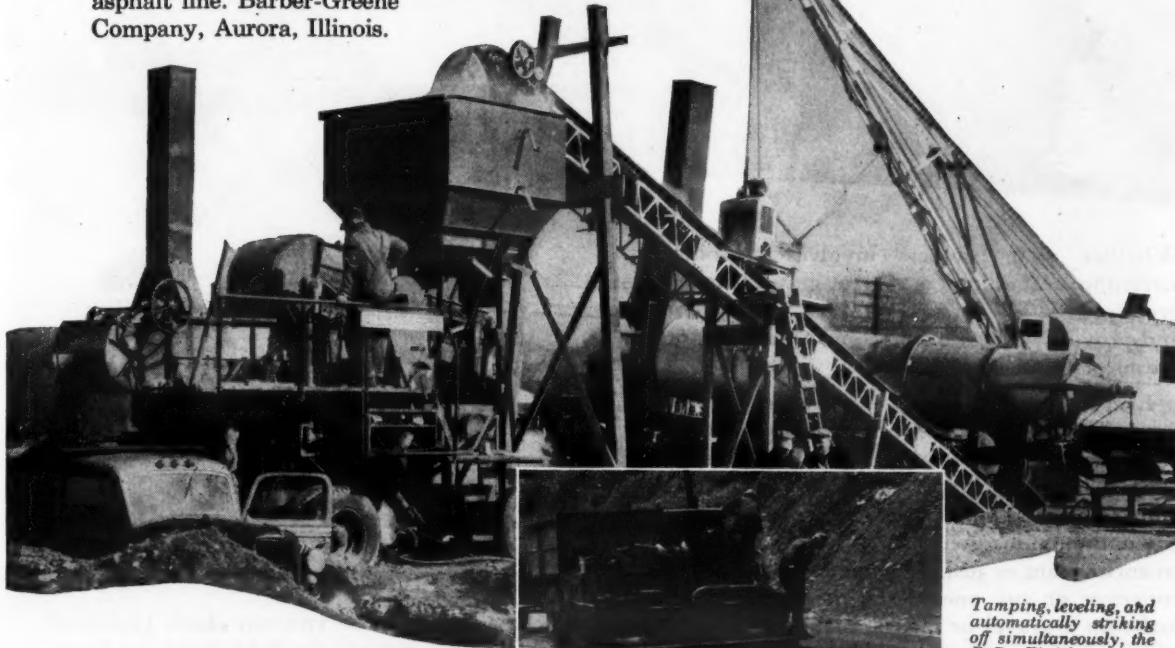


How a B-G Asphalt Plant Provides "Intermediate" Mixing

• For "intermediate" roads—roads having traffic too heavy for a travel plant mat, but not sufficient to warrant the high type, densely graded Class I mixes—the Barber-Greene Mixer and Dryer may be combined to provide a plant quality mix at 10 to 120 tons per hour, depending on size of units.

Moisture content—responsible for the failure of many secondary pavements—is positively controlled by the B-G Intermediate Plant. In addition, use of heavier bitumens is permitted, producing a higher quality surface than can be obtained with road mix. And frequently at comparable cost. Temperature control gives this B-G plant a wide range of application, from road mix types to high quality asphaltic concretes. High capacity and low erection costs make high quality pavements possible on roads formerly restricted to mixed-in-place surfaces.

The same Barber-Greene Mixer and Dryer can be used in various other set-ups as required during the year. Write for illustrated information on the Barber-Greene asphalt line. Barber-Greene Company, Aurora, Illinois.



Tamping, leveling, and automatically striking off simultaneously, the B-G Finisher accurately measures the amount of paving material and maintains uniform depth.

Barber-Greene

CONSTANT FLOW EQUIPMENT



PERMANENT CONVEYORS • DITCHERS • PORTABLE CONVEYORS • FINISHERS • BITUMINOUS PLANTS • COAL MACHINES

Truck-Mixers Aided By New Water System

Fast, uniform distribution of the mix-water to the concrete batch under all operating conditions is achieved in the Model 1946 truck-mixer of the Jaeger Machine Co., 701 Dublin Ave., Columbus 16, Ohio. This improvement has been accomplished by the development of a clog-proof water jet, which eliminates clogging by the grout.

A Jaeger Sure-Prime pump provides pressure for the water line and obviates the overhead gravity water tank. Since the mix and flush-water tanks are mounted solidly on the main frame, they are protected from distorting stresses which might affect the accuracy of measurement, it is claimed. This set-up also allows the enclosure of the mixer's entire front end for weather protection.

This and other improvements incorporated in the 1946 Jaeger truck-mixers are described in the firm's catalog, available on mention of this notice.



The Jaeger 1946 truck-mixer has an improved batch-water system.

U. S. Conciliation Service Smooths Labor Problems

Oil for the troubled waters of labor-management relations has been furnished since 1913 by the Conciliation Service of the U. S. Department of Labor. The agency, which uses methods of voluntary conciliation and mediation in attempting to settle cases without interrupting production, is now being strengthened and enlarged. Its services are available to any member of labor, management, or the public seeking to

solve a labor dispute. The Service has issued a bulletin, "What Is the Conciliation Service?", which it offers free to readers of **CONTRACTORS AND ENGINEERS MONTHLY**.

Copies of this descriptive summary can be obtained by writing to the Conciliation Service, Room 4223, U. S. Department of Labor, Washington 25, D. C.

Vertical-Boom Ditchers

Vertical-boom ditchers for many specialized types of trench digging are featured in a 28-page catalog available from the Barber-Greene Co., Aurora, Ill. The booklet is profusely illustrated with on-the-job photographs of the various B-G ditchers. Data and specifications are presented, operating details are explained, and various accessories shown.

Copies of Catalog 44 can be obtained by readers of **CONTRACTORS AND ENGINEERS MONTHLY** who write the firm at the above address and mention this notice.

Boston Office for Fawick

The opening of a New England sales office has been announced by the Fawick Airflex Co., clutch manufacturer of Cleveland, Ohio. Located at the Transmission Engineering Co., 102 St. Mary's St., Boston 15, the office will be managed by Stanley T. Johnson, formerly with General Electric and Electric Storage Battery.



Whether your problem involves crushing, screening, or handling of rock or gravel, rugged profit-proved Universal equipment will solve it and provide highest output, at lowest cost for the most years.

Every Universal Plant — and every part of every Universal Plant — from charging hopper to delivery conveyor — is designed to turn out maximum capacities at lowest cost, and is built for a long service life, ease of operation and minimum maintenance. Whether you need an entire plant or just a crusher, feeder, screen, conveyor or any one of the parts that go to make up a gravel or quarry plant, it will pay you in the long run to consult your Universal dealer.

Two soundly engineered high-output Universal Plants are pictured. At the top is an 822-Q; the outstanding two unit, portable rock plant. It is shown turning out road rock for a Wisconsin contractor who operates a number of Universal plants.

At right is a Universal 880 Gravelmaster working in a pit near Stillwater, Maine. This single unit, complete gravel screening, crushing and loading plant is noted for its large capacity and extreme portability. Numerous owners are profiting from their use.



In a few minutes you can check Universal performance against the field. Send for literature.

UNIVERSAL ENGINEERING CORPORATION

620 C Avenue, West
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FOR FORTY YEARS
UNIVERSAL
ROCK AND GRAVEL CRUSHING
AND SCREENING PLANTS
ASPHALT PLANTS - SPREADER-ROLLERS

The Unbreakable Braces that make Trenching Safe!



Simplex Trench and Timber Braces, 18' to 60' long (in closed position)

Construction men everywhere accept Simplex Trench and Timber Braces as the most positive insurance against cave-ins and the need for re-digging. Only Simplex braces have drop forged balls and sockets and lever nut. The blunt safety nut gives added protection against accidents. These unbreakable braces are far stronger and more durable than malleable braces. Adaptable to any width of trench. Ball and socket joints at both ends permit quick adjustment to any angle.

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Chicago 44, Illinois

SIMPLEX
WORLD'S MOST
COMPLETE
LINE OF
JACKS
LEVER
SCREW
HYDRAULIC

MOVING? Be sure to give us 30 days' notice of your change of address—and let us have your old as well as your new address.

Unless you do this you may skip an issue or two before the correction is made—and you won't want to be missing any issues of **CONTRACTORS & ENGINEERS MONTHLY** these days!

CONTRACTORS AND ENGINEERS MONTHLY

470 Fourth Ave., New York 16, N.Y.

Hopper Dredges Used To Maintain Channel

(Continued from page 6)

which the material flows into ten interconnected hoppers located amidships and occupying most of the beam of the dredge. These dredges, which are under way as they pump mud, are kept on their course by means of buoys, an advantage over other types of dredges which require ranges to be set up on land at frequent intervals by survey parties.

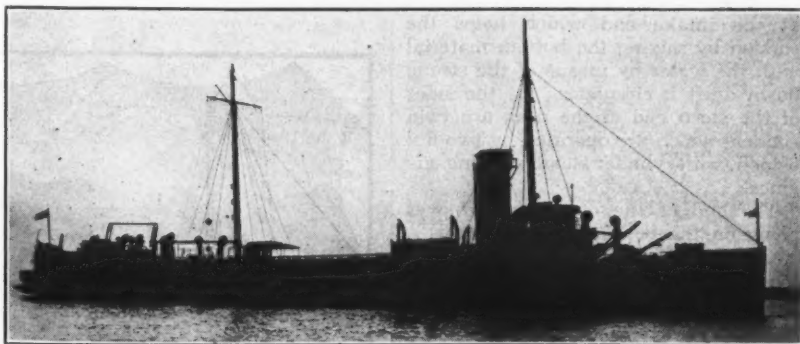
Shoals in the river are discovered by surveyors in power boats who are continually recording the depth of the river on their electric sounding machines. The limits of the shoals are indicated by taking soundings 500 feet apart in both directions, from which information the outline of the high area on the river bottom is plotted. Shoals take all sorts of shapes and are of irregular depth ranging from short, shallow layers of mud to high areas as long as 10,000 feet and as much as 5 feet in depth, although these high spots are removed almost as quickly as they form so as not to interfere with navigation.

Dredging Cycle

When pumping mud from the river bottom, the dredge never waits until her hoppers are full of solid material before going to the dumping areas for unloading, as much valuable time would be lost while waiting for the material to settle out. Instead, a series of tests are run to determine the most economical time to be allotted for pumping alone. These tests are repeated at least once a week, and whenever there is a noticeable change in the kind of material being dredged. In addition to the density-of-material factor, the speed of the dredge and the distance to the dump are also taken into consideration in order to arrive at the best combination of timing for the five operations which complete a dredging cycle. These five steps are: pumping, turning, hauling to dump, dumping, and returning to the cut.

If mud, for instance, is the material being dredged, it has been found most economical to fill the hoppers only to about one-third of their capacity for solids. In this way more loads can be carried, and the total yardage for the day will be greater than if the dredge had to wait until more solids came out of suspension so that the hoppers were completely filled. The key to the loading is the number of cubic yards moved per elapsed minute.

Taking the river as a whole, the per cent of solids averages between 20 and 40 per cent of the total material that is pumped, with this figure increasing to as high as 55 per cent when a sandy bottom is being dredged. These findings are obtained from actual tests made daily by taking a sample of the



U. S. E. D. Photo
The sea-going hopper dredge New Orleans, used by the U. S. E. D. for channel maintenance in the Delaware River, is 315 feet in length, carries eleven officers and a crew of fifty-two, and in an average 24-hour day has moved 20,196 cubic yards of material, traveling a total of 86 miles to and from the dump.

dredged material from the bottom of the hopper and another at the halfway mark. The weight of the solid material and also that of the liquid in these bottles is then determined, and an analysis of the results indicates the total yardage of solids that is being carried in

the dredge at any one time. By careful comparison with the results of similar tests taken at various intervals during the pumping operations, the optimum time to be given to pumping can be fixed. In this way it is always certain that the greatest possible yardage is be-

ing removed from the bottom of the river in the shortest time.

The New Orleans

Queen of the hopper-dredge fleet, based on comparative records, is the New Orleans, a long, low, trim-looking craft built in 1912 at Quincy, Mass., by the Fore River Shipbuilding Co. at a cost of \$520,101.69. Originally destined for work on the lower Mississippi, the locale of the dredge was changed to the Delaware where the less swift currents were better fitted to the horsepower capacity of its engines. Its overall length is 315 feet, with a 50-foot beam and a 26-foot depth. When light, the dredge has a draft of 14½ to 16½ feet from bow to stern, which is increased to an average of 23½ feet when loaded with river mud. The displacement is 4,700 long tons when light, and 7,150 long tons when loaded.

The hull and superstructure are steel, and have been recently repainted in the old-ivory and black colors of the U. S.

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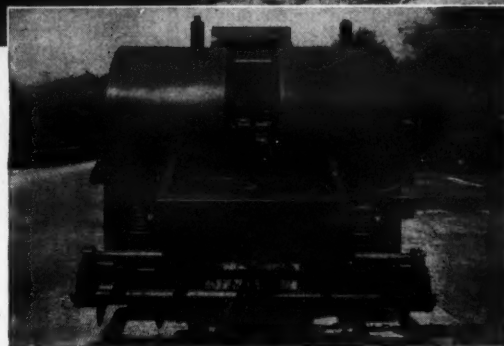


- ★ SELF-CONTAINED ★ SELF-PROPELLED
- ★ MIXING CAPACITY 100 TO 120 TONS PER HOUR
- ★ PAVING SPEED 4 TO 50 FT. PER MIN.
- ★ ROAD SPEED UP TO 18 MILES PER HOUR

MIXES, SPREADS AND LAYS ANY TYPE OF MIXED-IN-PLACE BITUMINOUS MATERIAL TO ANY ROAD WIDTH, THICKNESS AND CROWN CONDITION

The Moto-Paver does the *complete mixing and paving job*. No separate loader or spreader is required—no trailer to haul the machine from one job to another.

This highly flexible mobile plant is especially adapted for resurfacing work on county roads and city streets, because of the different



Rear view, with strike-off bar removed to show the patented spreading arrangement and controls

types of pavement that can be produced with it, and because it can be quickly moved from one job to another under its own power. The Moto-Paver is also highly efficient on new construction.

Bulletin MP-46, giving complete information and specifications, will be sent on request.

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Hetherington & Berner

BUILDERS OF PORTABLE AND STATIONARY ASPHALT PLANTS OF ALL TYPES AND CAPACITIES

High Pressure Control HOSE ASSEMBLIES

This summer's requirements need your attention now

ANCHOR has a complete stock of hose and couplings to supply flexible control hose requirements on hydraulically operated equipment. The patented grip feature of our couplings gives maximum dependability and hose life. This is the only coupling that employs a ductile sleeve to unite it with the hose reinforcing braids. Sizes supplied 3/16" I.D. to 1 1/2" I.D. inclusive in HIGH Pressure, MEDIUM Pressure, LOW Pressure constructions.

Send your specifications and inquiry

Anchor Coupling Co., Inc.

342 N. Fourth Street
Libertyville, Illinois

Factory Branch
12341 Cloverdale Avenue, Detroit 4, Michigan

Hopper Dredges Used To Maintain Channel

(Continued from preceding page)

Engineers, after having gone through the war period in the drab dress of Navy gray. On board are accommodations for eleven officers and a crew of fifty-two who work a 5-day 40-hour week, with the day divided into three shifts, each of which has a complement of three officers and fourteen men. This sea-going hopper dredge, which has a speed of 7.5 mph when light and 6.7 mph when loaded, can cruise for 288 straight hours without refueling, if necessary.

Source of Power

Located forward is the boiler room containing four Combustion Engineering Co. water-tube marine-type boilers, with tubes 11 feet 9 inches long and 2 and 4 inches in diameter. Under each boiler are four oil burners heating 3,800 square feet of surface and generating steam at a pressure of 210 pounds to the square inch. On each side of the room is a 50,000-gallon fuel tank from which oil is pumped at the rate of 8,500 gallons a day by two pumps, situated in the middle of the room, to the burners which go off and on automatically.

From the boiler room the steam is conducted aft 200 feet through the bilges to the engine room in the stern of the New Orleans, where four vertical inverted triple-expansion steam engines, two for propelling and two for pumping, are located. All these three-cylinder engines have the same dimensions, 12, 19, and 32 x 24 inches, which are respectively the three diameters of the high, intermediate, and low-pressure cylinders, and the length of the stroke. The two aft engines of this group propel the vessel through two 10-inch shafts to the twin 10-foot 4-blade propellers with a pitch of 7½ feet. Each engine has an indicated horsepower of 672 at 162 rpm, or a total propulsion of 1,344 hp. The two forward engines each have an ihp of 625 at an average of 150 rpm, or 1,250 total, and each is hooked up to a dredge pump at the side. These 26-inch dredge pumps have a 76-inch impeller which moves at a rate of 150 rpm. Steam is delivered to the engines at a pressure of 200 psi.

The exhaust steam from the engines is condensed to water and used again in the boilers after having passed through a hot well located between the two pumps. Just aft of the engines are two evaporators which provide 23 tons of water a day for the boilers and other fresh-water needs of the dredge. This is stored in a 300 and a 1,000-gallon tank near the two main pumps. Surrounding the engines are numerous other pumps for various purposes, including jet pumps for washing the ship, two feed pumps for the boilers, sanitary-system pumps, condenser, evaporator, and fresh-drinking-water pumps. Here are also two hydraulic pumps which can exert a pressure of 350 psi in operating the dumping gear on the hoppers.

At the Stern

Cut into the stern of the dredge is a well, 76 feet long x 6 feet wide, running down the center line towards amidships. This well houses the drag, 70 feet long and weighing 85 tons, which is pivoted at the forward end so that it can be raised or lowered to a maximum dredging depth of 45 feet and a minimum depth of 20 feet. Motive power for this operation comes from twin Lidgerwood hoisting engines, 12 x 12-inch, housed on the top deck, with 1½-inch steel-wire cable running through sheaves. This stern drag, classified as the New York type, is a steel framework which carries the two 26-inch intake pipes, each of which has a vent tube above it

at the intake end which helps the suction by mixing the bottom material with the water by means of the strong down draft it circulates. At the sides of the stern end of the drag are twin rudders which are operated by two 6 x 6-inch twin-cylinder steam steering engines.

The end of the drag which moves along on the bottom of the river is a steel grid whose position is controlled by the drag tender from his post in a small deckhouse amidships, just aft of the hopper storage bins. He regulates the depth of the drag by turning a wheel mounted on a vertical shaft on which is marked a gage showing at what depth the drag is working. Whenever the drag rests unsupported on the bottom of the river, a red warning light flashes in front of the tender who lifts it at once. If the intake end settles too far into the river bottom the pumps are apt to choke, while on the other hand, if the drag is too far off the bottom the dredge is pumping water and not much

(Continued on next page)



Rounding the Curve of "Safety first" at Low Cost—**TUTHILL GUARDS**

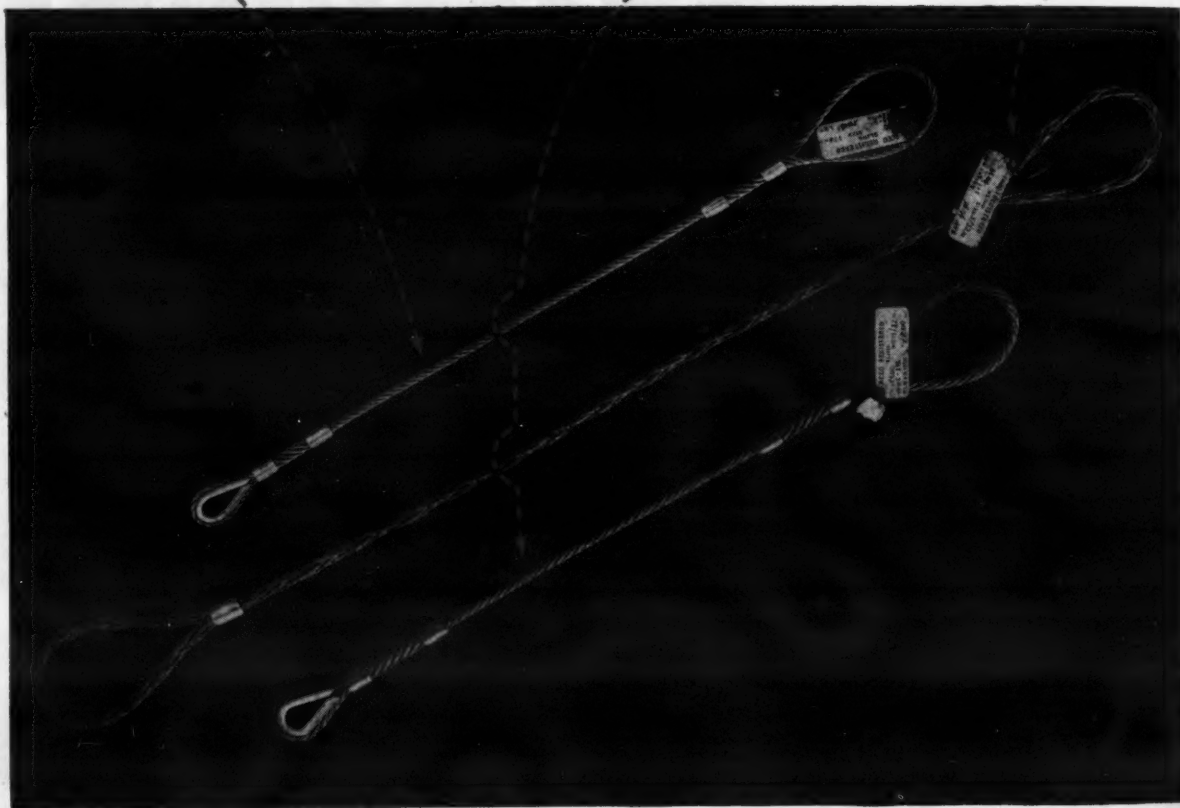
CURVES, embankments, bridge approaches, grade crossings—all are made safe with the TUTHILL Guard. It combines high visibility, flexibility plus strength, low-cost installation, and economy of maintenance. Available for maintenance or installation. Request details.

Pacific Coast Manufacturers and Distributors: U. S. SPRING & BUMPER CO., Los Angeles, Calif.

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762 W. POLK ST. CHICAGO 7 ILL.



WHICH SLING? Strand-Laid? Cable-Laid? Braided?



American Cable has a wider range of sling types than any other manufacturer. Here you can get the exact type of sling best suited to your job. Whether the conventional strand-laid sling, the cable-laid sling, or braided slings made up in 4, 6 and 8 parts, American Cable engineers hold no brief except for the one that will do your job best. And in wire rope endings, too, American Cable takes the lead with the new, 100% efficient ACCO-LOC Safety Splice and the swaged U-LOC. More than this, you may have your American Cable slings proof-tested and registered for known strength and safety. Here again is another sling service that is exclusive with American Chain & Cable. You cannot buy a better sling than an ACCO-Registered sling — made of TRU-LAY Preformed Wire Rope of Improved Plow Steel.

ACCO

Wilkes-Barre, Pa., Atlanta, Chicago, Denver, Easton, Pa., Houston, Los Angeles, New York, Philadelphia, Pittsburgh, Portland, San Francisco, Tacoma, Seattle, Bridgeport, Conn.



In Business for Your Safety

**AMERICAN CABLE DIVISION
AMERICAN CHAIN & CABLE**

Hopper Dredges Used To Maintain Channel

(Continued from preceding page)

else. The ideal position is to have the drag just scraping along the bottom, loosening material with its grid-like shoe so that it will be taken up by the two 26-inch intake pipe lines.

While the drag tender cannot see the river bottom, he can get a pretty clear picture of what the conditions are beneath him at any time by watching the material as it is discharged before him into the hoppers, and by listening to the pumps which sound differently according to the material being dredged; the lighter the material the quieter are the pumps, while when the material is heavy the pumps are noisier. A dredge crew must actually be well versed in two occupations, that of a sailor to operate a sea-going vessel, and also a mud digger with special machinery to use for tools.

Dredging

While dredging, the New Orleans usually moves over the bottom at a speed of from 2 to 3 mph, for if a faster speed is maintained the effect is as though the dredge were running away from its material, while if it goes more slowly, too deep a hole would be dug at a time. At 2 to 3 mph, headway can be held and good dredging results. Material is pumped into the twin 26-inch pipes at an average vacuum of 20 inches, and then passes through hydraulically operated gate valves before entering the pump. These valves, located below the water line, can be shut off when it is necessary to work on the pumps.

Twin discharge lines, also 26-inch, run from the pumps to a spillway at the center of the vessel where the material empties out of 26-inch square discharge vents, or trim gates, six on each side, with an additional outlet at the end of each pipe. The openings of the trim gates, which can be adjusted by manually operated valves on the deck above, are placed opposite each other in the spillway so that the force of the discharge from the pipes, by meeting a force coming from the opposite direction, is immediately reduced from a velocity of 18 feet per second to 0, thereby greatly aiding in the settling of

the solids.

From the center spillway the dredged material flows into the huge central hold of the vessel, 90 feet long x 40 feet wide and 27 feet deep. This space is divided into ten compartments, five to a side, each 20 feet wide, with each compartment further subdivided by a bulkhead into which a limber hole is cut in order to distribute the material more evenly, and to reduce the agitation of the water, thereby speeding the settling of the solid material. The total capacity of these ten hoppers is 3,100 cubic yards. Around the outside edge of the hoppers, a coaming has been built to prevent the material from spilling out before it gets a chance to settle. As the hoppers fill up, the solids fall to the bottom, while the liquids flow over the tops of the bins and down the outside into overflow channels, discharging into the river through ten 14-inch oval pipes on each side of the dredge.

Typical Operation

A typical operation of the New

Orleans was the dredging of a shoal nearly a mile long and of varying width, during which the dredge worked over a section of the cut pumping 30 minutes at a time and making two passes over the 12-foot strip. If the material had been sand instead of mud, the pumping time would have been shorter since sand settles out faster. A load of sand is usually taken aboard in 25 minutes.

Buoys are placed at each end of a shoal being removed but as these must be offset along the edge of the channel, great skill and judgement of distance are necessary in order to keep the dredge on its true course. This is particularly true after one lengthwise pass has been made over the cut, and the dredge must turn around in a wide sweep and go back over the same narrow 12-foot strip. The regular channel markers on the range center line are also of help in keeping the dredge on its course. A check over the bottom is taken by the survey party at frequent intervals, and the results of their soundings are a further guide as to how the pumping is

progressing.

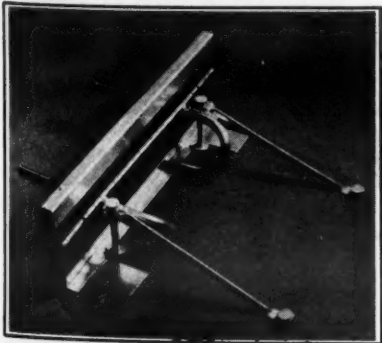
When the hoppers are loaded to the limit predetermined by the tests, the dredge moves to the dumping area to drop its material. In this particular case the distance was only 3.1 miles, but some hauls are as long as 15 miles, with the average distance that the dredges travel from the channel maintenance sections to the dumping areas being 6 miles. As far as possible, these dumping areas are located so as to shorten the haul.

They consist of two large holes dug into the bed of the river, the holes being 500 feet long x 150 feet wide x 40 feet deep, located 500 feet apart from edge to edge of hole. Their average distance offshore is about 750 feet. Six double-hole dumps have been excavated in the Delaware offshore locations where the material can eventually be pumped and wasted. In addition to these sites, the dredges also unload in some deep natural holes further down the bay. Although the dredged material must be

(Concluded on next page)

Well Anchored Joints For Concrete Paving

Tested and Proved for the past 10 years



DOW-WELD

Assembled Expansion Joints

The DOW-WELD joint is delivered in the form of a rigid welded truss unit and is permanently anchored to the subgrade, thus insuring a true alignment of the dowels. Due to the staking device it is not necessary to disturb the concrete.

This joint has been extensively used for the past ten years on major highway and airport projects, and the results have been tested and proven to be satisfactory.

We shall be glad to furnish the location of such projects upon request.

DOW-WELD CO., Inc.

21st St. West of Howard, Baltimore 11, Md.

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For the LOWEST COST AIR you've ever known, equip with "AIR PLUS." Sizes 60 to 500 feet. Distributors in 120 cities.

THE JAEGER MACHINE COMPANY, Columbus 16, Ohio

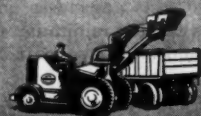
REGIONAL OFFICES: 8 E. 48th St. NEW YORK 17, N. Y. 226 N. LaSalle St. CHICAGO 1, ILL. 235-38 Martin Bldg. BIRMINGHAM 1, ALA.

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- 20% to 30% slower, long-life piston speed, 100% efficient intercooling, automatic drainage.
- Big engines of latest type.
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JAEGER

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"FLEET-FOOT"
Concrete Mixer



"SPEEDLINER"
Concrete Mixer



"SURE PRIME"
Concrete Mixer

JAEGER-LAKEWOOD SPREADERS, FINISHERS AND BITUMINOUS PAVERS, FORMS, FORM TAMPERS—"DUAL-MIX" TRUCK MIXERS, AGITATORS—JAEGER HOISTING ENGINES, TOWERS

Hopper Dredges Used To Maintain Channel

(Continued from preceding page)

rehanded in this method of disposal, it is really a great saving in time and money, for otherwise the hopper-bottom dredges would have to make a 100-mile round-trip haul to sea in order to unload their contents.

The two holes are connected by a floating pipe line, and while dumping is being done in one hole, the other hole is pumped out by a pipe-line suction dredge with the material passing through a pipe line supported on pontoons running in to the shore. When one hole has been cleaned out, the dredge moves to the other, while the hopper dredge then unloads in the empty hole. The outlines of the dumping areas are well defined both by piles driven in the river bed, and by ranges erected on the shore, and are equipped with lights as markers for work at night.

When the dredge reaches a position directly over the hole, the hydraulic pump controlling the operation of the gates at the bottom of the hoppers is turned on, and the gates swing open.

Dumping Cycle

An analysis of one particular cut along Tinicum range between Philadelphia and Chester showed that the complete cycle of operations took 100 minutes. This was divided in the following manner:

Operation	Time In Minutes
Pumping mud	30
Turning dredge	10
Going to dump	10
Dumping	10
Returning to cut	20
Total	100

In an average 24-hour day the New Orleans moved 14 loads for a total of 20,196 cubic yards of material, or 1,443 yards per load. The 24-hour, or 1,440-minute, day was broken up as follows:

Operation	Time In Minutes
Pumping mud	440
Turning dredge	150
Going to dump	360
Dumping	140
Returning to cut	350
Total	1,440

Considering only the time consumed

in pumping, the New Orleans dredged 46 cubic yards per minute, while if figured on the basis of 24-hour operation the dredge pumped 14 yards per elapsed minute, that is including all phases of the dumping cycle. On this run the vessel traversed 120 miles in 24 hours, 34 miles of pumping and turning, 43 miles going to dump, and 43 miles returning to cut.

Equipment and Personnel

The dredge is maintained in first-class shape with all necessary minor repairs being made on board in a well equipped machine shop located forward just above the boiler room. The 16 x 24-foot shop is lighted both by electricity and natural illumination from an overhead skylight. At one end of the room is a work bench with a 6-inch bench vise, and bins beneath for keeping parts and tools. A Troy steam engine, 7-inch bore x 7-inch stroke, operating on a pressure of 100 psi, drives a countershaft to which the heavy equipment is geared. Working from

this overhead shaft are a Rahn-Larmon lathe, with a 24-inch swing and 8-foot bed; a Rockford 20-inch drill press; a Steptoe 16-inch shaper; a 5/16-inch drill; and an 8-inch emery wheel and sander.

Last autumn when some of the warships of the U. S. Navy visited Philadelphia, the New Orleans was pressed into service to do a hurry-up job of dredging a berth for the big aircraft carrier Lake Champlain. The vessel was to be docked at Pier 100S, foot of Oregon Avenue, requiring the New Orleans to dredge an area 1,600 feet long, from the back of the dock to the ship channel, 105 feet wide, and 30 feet deep. In 2½ days the "Vacuum Cleaner of the Seas", as the New Orleans is sometimes styled, dredged 16,803 cubic yards and hauled it 7½ miles to a dumping area so that the carrier had proper docking facilities when she arrived in port.

Captain W. M. O'Neal is Master of the New Orleans and Jesse A. Ramsey is Chief Engineer. They are both on



"I wish I had a more comfortable seat on my motor grader, boss."

call 24 hours a day while each shift also has a mate and engineer on duty. Captain N. B. Scarborough is in charge of all dredging operations, assisted by E. E. Krauss. Col. F. F. Frech, C.E., is District Engineer, U. S. Engineers, with headquarters located at Philadelphia, Pa.

NEW IMPROVED SUPER-LUBRICANT

FOR TOUGHEST LUBRICATION JOBS
IN ALL INTERNAL COMBUSTION ENGINES



BASICALLY DIFFERENT... SPECIALLY REINFORCED!

- Resists Formation of Sludge, Lacquer, Carbon
- Removes Hard Carbon
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- Keeps Piston Rings Free
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Accepted by Leading Engine Manufacturers as a Superior Lubricant for Heavy Duty Engines.

LION Naturalube D.H.D. OIL

Naturalube D.H.D. is made from a rare and basically different crude oil. This unusual crude gives D. H. D. a much stronger protective film than ordinary oils . . . greater ability to penetrate to all moving parts . . . greater adhesiveness . . . and the natural ability to remove hard carbon deposits from valves, rings and pistons. In addition, Naturalube D. H. D. is reinforced to prevent the deteriorating effects of heat and oxidation, and to resist the formation of harmful sludge and lacquer. It is also non-

corrosive — safe!

When you use D. H. D., engines are cleaner . . . rings, valves and pistons operate freely for longer periods . . . filters, screens and oil lines do not clog and prevent proper lubrication of all parts. Because Naturalube D. H. D. removes carbon, there is no hard-carbon scuffing. The general performance of your engine is improved, operating and maintenance costs are lower, and shut-down time is held to a minimum. D. H. D. saves wear, adds power, saves fuel. Try it.

For normal service where D. H. D. is not required, use Naturalube Motor Oil (not so heavily reinforced).

POSITIVE MONEY-BACK GUARANTEE

Your money returned if you don't believe Naturalube to be the best oil you ever used.



LION OIL COMPANY

EL DORADO, ARKANSAS

EMBURY

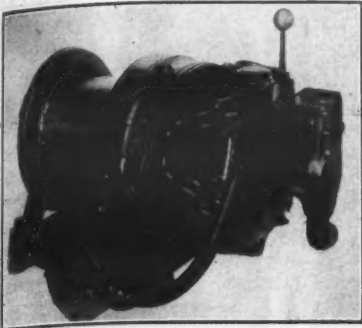
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HIGHWAY TORCHES

Always on Guard!

Order through Your Jobber

EMBURY MFG. CO., WARSAW, N. Y.



A feature of the new Gardner-Denver Model HKK air hoist is a positive and entirely automatic safety brake.

Hoist Accidents Cut By New Safety Device

A safety feature for use when hoisting timber, steel, and other supplies has been developed by the Gardner-Denver Co. Available on G-D's Model HKK hoist, it consists of a spring-loaded brake, which is held in the "off" position by air pressure. Should the air supply fail for any reason, this brake automatically takes hold to prevent the load from falling.

The brake is released by moving the throttle valve, which automatically returns to neutral when released by the operator. Any load within the hoist's capacity will be held in suspension by the device until air is again admitted to the motor and the load picked up. The Model HKK single-drum safety hoist has a rated vertical lift of 2,000 pounds at 80-pound air pressure.

Further details on this new safety device can be secured by writing the Gardner-Denver Co. at Quincy, Ill. Mention this notice.

Broken Drill Bits Recovered by Magnet

An irritating cause of lost time on drilling jobs is the breaking of bits or rods in the drill hole. A new magnetic device for the removal of such broken pieces has been announced by the Dings Magnetic Separator Co. Carried in one's pocket, the Extractor weighs but a pound, yet can lift as much as 25 pounds.

The unit is fastened to the face of an old drill bit and put into the hole at the end of a drill rod or wood pole. It is made in 1 1/4 and 1 1/2-inch diameters from a new type of Alnico magnet steel, which is said to have nearly twice the metal-attraction of earlier Alnico steels.

More information on how the Dings Magnetic Drill Extractor may often save redrilling can be obtained by writing the manufacturer at 509 E. Smith St., Milwaukee 7, Wis. Mention this CONTRACTORS AND ENGINEERS MONTHLY news item.

French Curve Is Beveled

Blots and smudges, the bane of many a draftsman, are reduced to a minimum with a new-type French curve made by the C-Thru Ruler Co., 385 Capital Ave., Hartford, Conn. All working surfaces on the curve are beveled to reduce the possibility of smudges. The instruments are made of 0.105-inch-thick, non-flammable, clear plastic, and come in sets of eight. Details can be obtained on mention of this item.

New Atlas District Mgr.

Following the transfer of W. T. Mahood to the District Sales Office at San Francisco, W. E. Collins, Jr., has been advanced to the Managership of the Atlas Powder Co.'s Seattle office. Mr. Collins spent two years in the Navy before returning to duty with Atlas last January. He was cited recently for his work in developing special demolition explosives, and in directing underwater demolition in the Pacific theatre.

New Timber-Truss Design Requires Less Material

A new-type timber truss that uses less than 50 per cent of the material usually required for conventional flat trusses has been designed by Everett S. Lank, of the Lank Woodwork Co. In tests by the Timber Engineering Co. at its Washington, D. C., laboratories, a 50-foot application of the design carried a full load of 40 pounds per square foot over 16-foot spacing for more than 6 months, with a total deflection of less than 1 inch.

Called the Lank-Teco truss, this same erection, in which Teco connectors were used throughout, had a total deflection of about 2 inches at double the design load, the equivalent of its original camber. Failure resulted from shearing out at a splice in the bottom chord with a load of over 36 tons of sand, more than 2 1/4 times the design load. In addition to its excellent strength, it is one of the most economical wood trusses ever designed, Timber Engineering Co. reports.

STAY IN THE LEAD



By using the HI-WAY MODEL R MATERIAL SPREADER

Reversible transmission on both the feed roller and agitator permits changing from forward to reverse motion, or vice versa, by simply shifting a lever.

The Swivel-type Adjustable Hitch allows the traction wheels of the Spreader to be on the ground at all times regardless of what position the truck or spreader is in. Easily coupled and uncoupled.

Disengaging lever for coupling and uncoupling is extended to the outside of the spreader, eliminating danger for the operator.

Sold and distributed by leading Construction Machinery Dealers throughout the United States and foreign countries.

Furnished in 6 widths—
from 8 to 13 feet

Write for detailed specifications

HIGHWAY EQUIPMENT COMPANY, INC.
Manufacturers of the World's Most Complete Line of Spreaders
CEDAR RAPIDS, IOWA, U.S.A.

BETTER BUILT FOR BEST PERFORMANCE

TRADE MARK

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7924 RIOPELLE ST. • DETROIT 11, MICH.
WORLD'S LARGEST MANUFACTURERS OF TRUCK AND TRAILER EQUIPMENT
OTHER PRODUCTS: TANKS • HEATING EQUIPMENT • MOTOR BOATS

Side dump Body
Telescopic Hoist
Automatic downfold

Type X Heavy duty
Body with downfold

Type W12 Body with heavy duty
Body with downfold
T-44 Model Capacity 19 cu. yds.

Special scoop end mucker Body.
Model F88 cam and roller
Hoist. Capacity 5 cu. yds.

Rock excavator body with
downfold

W12 Body with F4C cam
roller Hoist. Capacity 6 cu. yds.

Telescopic boom
8 to 20

Type C12 Body with Model D6 or D7
Hoist. Dump angle 55°

Type W12 Body with single telescopic
hoist. Double acting telescopic
Capacity 4 cu. yds.

Asphalt Mix Smooths An Old, Uneven Street

Accumulation of Dirt and Patching First Removed From Cobblestone Paving For New Two-Course Top

A MUCH needed improvement was made last autumn to Central Avenue in Pawtucket, R. I. The Campanella & Cardi Construction Co. of Providence, under contract to the Division of Roads and Bridges of the State Department of Public Works, laid a two-course asphalt pavement for the 2-mile stretch from Broadway, or U. S. 1, east to the Massachusetts state line. This 48-foot thoroughfare had been in very bad shape from neglect when the State assumed its maintenance and started the reconstruction.

The original pavement was built of cobblestones at an early date in the history of the city, and a double trolley track ran in the center of the street. The cobblestones had subsequently been covered with several bituminous layers of pavements and patches; the trolley line had been abandoned, but the largest section of its tracks had been left in and covered over. To level the grade in certain areas, gravel had been dumped on the street and given a bituminous treatment; in some places this had stuck, but in others it had loosened and broken up to contribute to the rough hard-riding qualities of the old road.

Grading

At the eastern 3,000 feet of this contract, the gravel to be removed averaged a full 8-inch depth, and had hardened over the years to such an extent that it was necessary to loosen the material first with a LeTourneau Rooter pulled by a Caterpillar D7 tractor before it could be excavated. A tractor-drawn Bucyrus-Erie S-90 8-yard scraper then picked up and hauled the material to a dump just off Central Avenue near the east end of the project where it was wasted. About 2,800 yards of lumpy roadbed was removed from the location in this manner by the tractor-scraper unit.

Over the rest of the job where the

gravel had not been used, the bituminous patching, sand, dirt, and other debris was scraped from the surface by an Adams power grader down almost to the old cobblestones. Following behind the grader came a D4 and Traxcavator which scooped up the windrow of waste material made along each curb and loaded it into two International trucks for hauling to the dump. The surface was then thoroughly swept with a Hough power broom pulled by a rubber-tired tractor, which was followed up by hand sweeping and shovel work around the uneven surface of the cobblestones. At the eastern end the gravel was shaped to the proper cross section by the grader, and then rolled by a Buffalo-Springfield 15-ton 3-wheel roller.



C. & E. M. Photo

After laying binder course on Central Avenue in Pawtucket, R. I., the Adnan Black Top Paver used by the contractor was cleaned with water from a hydrant and served prior to laying sheet-asphalt top.

After the roadway was well cleaned, the next step was applying a tack coat of RC-1 asphalt at the rate of 0.25 gallon to the square yard. The results, when applied to an experimental stretch

of cobblestones, were not very satisfactory because of the uneven surface, so the spraying therefore was confined to the recently graded section at the east—
(Continued on next page)



**America's Most Complete Line
of Material Handling Buckets**

All purpose—

- **SHOVEL**
- **PULLSHOVEL**
- **DRAGLINE**
- **CLAMSHELL**

• **FRONTS, BOTTOMS, SCOOPS and TEETH** are 14% manganese steel developing tensile strength up to 120,000 p.s.i. This high percentage manganese steel gives tough, rugged strength for hard service and allows wide set corner teeth for easy entrance in digging. Volume production methods enable us to build a better bucket with amazing economies in manufacturing.



Clamshell
Sizes $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, 1½, 2 yds.



Pullshovel
Sizes $\frac{3}{8}$, $\frac{1}{2}$ and $\frac{3}{4}$ yd.



Dragline
Sizes $\frac{3}{8}$, $\frac{1}{2}$, $\frac{3}{4}$, 1, 1½, 2, 2½ yds.



Shovel
Sizes $\frac{3}{8}$ to 18 yds.

On the ½ yd. and ¾ yd. Shovel, Pullshovel, and Dragline Buckets, all teeth are interchangeable — a great advantage to operators.



Experience Counts
See your shovel man or equipment dealer about PMCO Buckets and Dippers.

PETTIBONE MULLIKEN CORP. CHICAGO 51, U. S. A.

WE OPERATE THE LARGEST AND MOST COMPLETE MANGANESE STEEL FOUNDRY IN THE UNITED STATES

CUMMER ASPHALT PLANTS

EIGHT SIZES

Up to 1000 Tons per day

DRYERS

Two-Fire and Internal Fire

30 to 100 Tons per hour

Electric Batch Timers

50 Years' Experience

THE F. D. CUMMER & SON CO.

EAST 17th & EUCLID
CLEVELAND 15, OHIO

Asphalt Mix Smooths An Old, Uneven Street

(Continued from preceding page)

ern end. The tack coat was applied by the G. A. Winter Co. of East Providence in four 12-foot lanes, and sand was spread over the material at street intersections so that traffic would not pick up the bituminous coat.

Black-Top Paving

The black-top sheet-asphalt plant-mix was purchased from the Sealdrook Paving Co. at Berkeley, R. I., and hauled to the road in a fleet of five Mack trucks over an average 6-mile haul. The trucks carried from 8 to 10 tons of material and at first were hired on the ton-haul basis. This method did not work out well, however, because of the many other customers buying material from the same asphalt plant, and the resulting long waits to get loaded as the trucks stood in line for their turn. One of the principal customers was the U. S. Navy which at times absorbed practically all of the production for use at the Quonset base, carrying it away in 12-yard trucks. Different arrangements were made whereby the number of hours that the trucks were in use was considered in calculating the rental price.

An Adnun Black Top Paver spread the plant-mix in four lanes across the 48-foot street with curbs on each side. The lane adjoining each curb was laid 13 feet wide, while the two center lanes were 11 feet wide. Only half the street was paved at a time so that traffic could be maintained on the other half. Such an arrangement was convenient also for the trackless trolleys which have operated on Central Avenue ever since the trolley-car line was abandoned 12 years ago.

The pavement was laid in two courses, plant-mix binder and sheet-asphalt top. The binder was supposed to be laid to a compacted thickness of 1½ inches, but the irregularities in the base were so pronounced that in some locations as much as 8 inches of binder was laid to make a level grade. In these cases the holes were filled first with binder and traffic was permitted to compact them before the binder layer itself was laid by the paver. The top course was spread to a loose depth of 1½ inches and compacted under rolling to a 1-inch thickness.

Material Shortage

With so many users of plant-mix, the deliveries to the job were intermittent, but care was taken wherever possible to avoid the necessity of making joints. The mix in the trucks was covered with tarpaulins so that its temperature would be kept close to 330 degrees F until it was dumped into the paver. The box on the Adnun was kept full of material until the next load arrived, even if stopping its forward progress was necessary, for in this manner the mix retained its heat and better results were obtained with the surface. At times, of course, the box had to be exhausted when the material was not arriving; then a square-cut joint was made so that a good bond and smooth lap were assured when the paving resumed.

In paving half the surface at a time, the 13-foot lane next to the curb was done first, then the adjoining 11-foot lane at the center. When working the outside lane, the side of the 10-foot spreader box away from the curb was kept closed to make a smooth firm edge, while the other side was left open so that two rakers could draw out the material the additional 3 feet, making a feathered edge to the curb. On the 11-foot lane both sides were left open so that a raker on each side pulled out enough material for the additional 6

inches of width beyond the limits of the 10-foot box.

When laying the binder, the paver was run in second speed at the rate of about 25 feet per minute, and it averaged around 1,200 feet of half width in a 10-hour day when the material was kept supplied. For the top course, where greater refinement was required in the spreading, the paver was run in low speed, or 18 feet per minute, for an average of 900 feet a day for half the pavement width. When moved about from one location to another on the job, the paver operated in high speed at the rate of 75 feet a minute.

Cool-Weather Methods

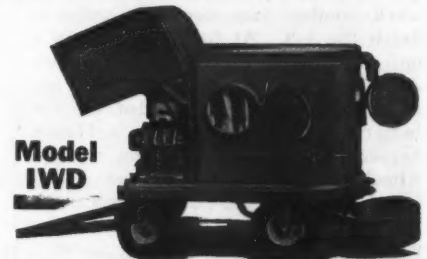
Work on laying the plant-mix started early in September, 1945, and was finished by the first of November. Ordinarily the bituminous-construction season ends in Rhode Island on October 15, but because of the almost impassable condition of the street and its importance as a main route from Pawtucket

(Concluded on next page)

What
YOU SHOULD
KNOW ABOUT

MARKLEY-CARTER Portable DUST COLLECTORS "Collects and Controls"

- 1 Portable units operate through powerful air stream by an effective double separation principle. No dust escapes into the air. Reduces SILICOSIS hazard to safe hygienic limit.
- 2 When applied to rock drills, SPEEDS UP DRILLING TO 33 PER CENT. Drill steel cuts into fresh rock unimpeded by dust or chips. PROLONGS LIFE OF DRILL STEEL. REDUCES SHARPENING COSTS.
- 3 Quick detachable hood permits easy inspection of hole and changing drill steel without interference from hood.
- 4 When applied as industrial unit, collects dust accumulations that are costly and apt to be a hazard both to men and equipment. Keeps your plant, motors and machinery free from harmful dusts.
- 5 Equipped with Markley-Carter disposal container which permits continuous collection and disposal without closing down the system.



Model IWD
Write for Bulletin 4402 which describes in detail the advantages of using MARKLEY-CARTER DUST COLLECTOR in your quarry and plant.

RALPH B. CARTER COMPANY
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TRAVEL WHERE YOU WILL... an HD-7 will cross your path

**USE IT
On Bulldozing**

**USE IT
On Scraper Work**

**USE IT
As a Combination
Bulldozer and Scraper**

It's a country-wide hit! East Coast, West Coast, North and South . . . popular Allis-Chalmers Model HD-7 2-Cycle Diesel Tractor is in demand everywhere . . . by contractors, states, counties, townships, ranchers, loggers, miners, gravel and quarry pit operators . . . for a multitude of jobs! Just the right size for most bulldozing work, ideal for operating 2-wheel scrapers — provides 60 drawbar h.p., speeds to 5 m.p.h. . . it's easy on fuel, easy on maintenance cost, easy to maneuver. Starts instantly! Travel where you will . . . you will find the HD-7 keeping production up . . . costs down. It will pay you to get all the facts from your Allis-Chalmers dealer.

ALLIS-CHALMERS
TRACTOR DIVISION - MILWAUKEE 1, U. S. A.

Asphalt Mix Smooths An Old, Uneven Street

(Continued from preceding page)

to Taunton, Mass., the contractor was given special permission to continue work another two weeks in order to finish the job. At first kerosene in a pail was used to clean off the shovels and rakes that handled the sheet asphalt, but this was discarded for the better results obtained from a Hauck kerosene burner mounted on a two-wheel carriage. This unit was pulled about by a Ford 1½-ton pick-up truck which also carried the tools for the workers.

Rolling of both courses was done by a Buffalo-Springfield 10-ton tandem roller, with a special technique for the cool weather. The Adnun paver has a double roller and it was found that the area just outside these rolled strips cooled off first. Accordingly the roller compacted the outside of the lanes first, and then rolled the center. Traffic was permitted on the base course 2 hours after the rolling, and on the top course from 2 to 4 hours afterwards, depending on the weather since plant-mix sets up faster in cool weather.

During the grading operations when the pavement was also being laid, the contractor used a force of about 35 men which was reduced to twelve when the paving was the only operation. They were divided as follows: a paver operator, a roller operator, a truck driver, a man to regulate the height of the screed, 4 shovelers to keep the rakers supplied with necessary material and also to clean up in advance of the paving, and 4 rakers. The rather large number of rakers was needed in the cool weather to manipulate the plant-mix before it got a chance to stiffen and set up. Between runs of binder and top material the paver was thoroughly cleaned with a kerosene pressure torch. Water from the city hydrant was available for the paver and roller.

Mix Used

The gradation of the binder and surface courses was as follows:

Sieve Size	Per Cent Passing Binder	Per Cent Passing Surface
¾ inch	95-100	.....
No. 10	15-35	10-40
No. 40	.....	22-45
No. 80	10	12-30
No. 200	5	10-20

Bitumen, 60 to 70 penetration 4-6 9½-12

The major items in this \$38,750 contract were the following:

Excavation	2,800 cu. yds.
Scraping and reshaping pavement	21,000 sq. yds.
Binder course	5,450 tons
Surface course	3,450 tons
Bituminous tack coat	7,400 gals.

Personnel

Gardner Anthony was Superintendent for the Campanella & Cardi Construction Co., while Walter E. French was Resident Engineer and Ai Round was Assistant Resident Engineer for the Rhode Island Division of Roads and Bridges of which George H. Henderson is Principal Highway Engineer, and Lee V. Spencer is Construction Engineer.

New Euclid Personnel

A new director of field engineering and two new sales-staff members have been appointed by the Euclid Road Machinery Co. of Cleveland.

H. W. Hiscox, formerly Southeast District Manager for the B. F. Goodrich Co., has been named Euclid's Sales Representative for Virginia and West Virginia. He will also assist the Export Department with Washington contacts.

A former Captain in the Air Corps, George M. Perry, has joined the Export Department as Assistant to the Manager. Educated abroad, Mr. Perry has had considerable sales experience in South America.

Associated with the Georgia Department of Public Health before the war, and until recently a Major in the Engineer Corps, Thomas A. Cantrell has assumed supervision of Euclid field engineering. He will study and prepare data on operation and costs for use by Euclid distributors and owners.

Crawler Replacements

Replacement crawler tracks and track wheels made by the Kuchar Track Wheel Co., Blue Island and Chicago, Ill., are listed together with specifications and prices in a new bulletin offered by the firm. Kuchar makes six

models of track wheels as well as eight different types of replacement tracks for Euclid, LaPlant-Choate, and Athey Forged-Trak and Truss Wheels.

Copies of the folder can be secured by writing Kuchar at 14410 South Western Ave., Blue Island, Ill., and mentioning this report.

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UP
THE HIGHWAY
JOB



Build your highway the Bethlehem way—by buying all your road-steel products from this single, reliable source.

Bethlehem supplies a complete line of highway steels, designed for efficient, economical installation, and built for rugged service. You'll find Bethlehem road steels dependable and easy to handle—which is one big reason why they'll help speed the job.

There's another reason, too. When you place your complete order with Bethlehem, you save yourself time and extra bookkeeping—and you get service that's co-ordinated all along the line. Shipments are scheduled to reach the job as needed, so that you'll avoid delays, and idle men and equipment.

Get in touch with the nearest Bethlehem district office—or with Bethlehem Steel Company, Bethlehem, Pa.—for full information about efficient, time-saving Bethlehem road steel service.

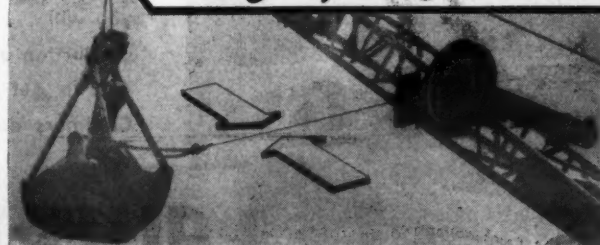
BETHLEHEM PRODUCTS FOR HIGHWAYS

Road Joints • Center Strip • Dowels
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Concrete Pipe • Bridge Floor Reinforcing
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The road joint shown above was designed and produced by Bethlehem for heavy traffic at New York City's big Idlewild airport.

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Steel strapping to hold column or pier forms in place is easily applied by the Steelbinder tool.

Forms Held in Place By Steel Strapping

A new method for holding in position the forms used in resurfacing columns, piers, and similar structures was demonstrated recently in Chicago. The project, which involved pouring concrete to weatherproof the columns of a Chicago & Western Indiana Railroad bridge, featured the use of steel strapping to hold the forms tightly in place.

Two bands of 0.025-inch steel strapping, each 3/4 inch wide, were affixed in place around the two-part form and tightened with the even-tensioning Steelbinder tool, supplied by A. J. Gerrard Co., maker of the steel strapping. When the lower half of the column had set, the straps were cut and the form was removed. Cleaned for further use, the form sections were then set in place on the base again, and one strap applied down low. Slid into place on the upper section of the column, the form was anchored by tightening this strap. When the scaffolding had been set up, the upper strap was placed on the form.

This method of holding the forms is said to result in speed, safety for the operator, and a uniform finish for the surface. The used strapping can be salvaged for further use on columns having smaller diameters. No shoring is needed to hold the forms in place on the upper section of the column.

Details concerning the use of steel strapping and the Steelbinder tool can be secured by writing the A. J. Gerrard Co., 221 No. LaSalle St., Chicago 1, Ill. Say you saw it in **CONTRACTORS AND ENGINEERS MONTHLY**.

Tires Aplenty—Soon!

An ample supply of truck and farm tires has been predicted for midsummer by John L. Collyer, President of the B. F. Goodrich Co. The tire market is opening up, and even passenger-car tires will be plentiful by the end of the year. Reconversion in the rubber industry has been rapid, and 1946 production levels will be 46 per cent above the 1940 output, he declared.

Mr. Collyer urged that synthetic-rubber research be pushed to the utmost, and that the road be kept open for the operation of synthetic plants by private industry. Synthetic rubber has reached almost the same performance value as natural rubber, for some uses, and its production costs are being rapidly reduced, he indicated.

Portable Power Saw

Designed especially for maintenance work, whether in the shop or on the job, the streamlined Saw Gun, a portable power saw and file, is described in a folder available from the Mid-States Equipment Corp., 2533 E. 73rd St., Chicago 49, Ill. The unit attaches to electric and air drills or flexible shafts for metal, wood, or plastic work.

The features of this saw are shown in the leaflet, which is available from Mid-States on mention of this notice.

Accounting System For Contractors' Use

An accounting system, tailor-made for the construction industry, has been developed by the Chicago firm of Tallman, Robbins & Co., following a study of problems peculiar to the field. The new system combines accounting records with job and payroll records, cost information, and tax data, all in one convenient unit.

Designed as a simple but complete record that "talks the contractor's language", the new system is said to be economical, complete, and easy to use. The small operator can use it without alteration, while the large contractor need include only a separate ledger and journal for a complete double-entry system. Four forms—cash receipts, expenditures, job record, and payroll record—comprise the system. All are contained in a loose-leaf cover, together with instructions, and a special contractor's tax calendar.

Construction terms are used in form

headings and in the instructions. A job-memoranda column allows the jotting down of data for use in figuring future jobs. Job-record entries are so arranged that actual and estimated costs can be compared and variations noted at once. One of the most valuable features, according to the creators of the system, is the ease with which the user can ascertain the proper percentage to be added to actual costs in order to

cover overhead expenses.

Complete details concerning this new accounting system can be secured by writing Tallman, Robbins & Co., Dept. 32, 314 W. Superior St., Chicago 10, Ill. Mention this report and indicate the type of construction in which you are engaged.

Accidents don't just happen. They are man-made, and can be prevented.



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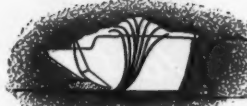


The scrapers that give you all the good points of other rigs — AND A LOT MORE BESIDES!


Whenever you find a scraper that consistently outperforms competitive models on job after job, it must have "something on the ball." And that certainly is the case with the new 8 and 14-yard LaPlant-Choate "Carrimors." On hundreds of tough earthmoving jobs from coast to coast these improved outfits are definitely getting bigger pay loads with less power . . . getting rid of them faster at the dump . . . and saving hours of costly "down-time" for maintenance and repairs.

Designed and built by earthmoving men with more than 33 years of specialized "know-how", LPC "Carrimors" are yards ahead in performance because they are years ahead in practical engineering features. But don't take our word for it. Ask to see them in action. Then you'll see why so many agree on LPC—for lowest possible cost per yard—wherever scrapers are used behind crawler tractors. LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa; Oakland, California.


*Reg. U.S. Pat. Off.



Easier Loading



Lower Horsepower Requirements



Faster,
Cleaner Dumping

LAPLANT - CHOATE

Job-Proved Equipment...

for lowest possible cost
in Moving Earth

Huge Machine Tests Structural Materials

A mammoth new testing machine to aid in the development of stronger and more economical structural materials and designs has been developed at the Technological Institute of Northwestern University.

Called a "fatigue tester", the 30-ton steel giant tests the strength of structural materials under continued and repeated stresses. It can stretch and compress a specimen 200 times a minute with both an extending and a compressing force of 250,000 pounds. Two separate specimens can be tested simultaneously in the 25-foot-long 9-foot-high machine.

The machine was designed and built by Professor Lawrence T. Wyly on the basis of the only other machine of its type, a similar tester developed by W. M. Wilson at the University of Illinois. Its immediate use is in the largest engineering research project now being carried on in this country, an investi-

gation of riveted and bolted connections.

The fatigue tester can subject a steel beam or joint to 1,000,000 repetitions of stress in 4 days, more than a bridge part undergoes in 50 years. Most tests range from 3 days to a week, the machine applying 250,000 stress repetitions a day. Despite this tremendous power, the tester produces no greater vibration to the building than a man's footsteps, because of a specialized spring suspension.

Lighting Lessens Crashes

During June, 1945, there were 214 traffic accidents on Missouri state highways. Of these, 89 (8 of them fatal) occurred after dark on unlighted routes, while only one accident, a non-fatal crash, occurred where there was lighting. In July the record reads much the same: 106 after-dusk accidents on unlighted streets and highways, with 9 fatalities; on lighted streets, 4 non-fatal accidents, the *Street & Traffic Safety Lighting Newsletter* reports.

New Model Portable 11-S Concrete Mixer

The third member of its redesigned line of concrete mixers, the Dandie 11-S, has been announced by the Kwik-Mix Co., Port Washington, Wis. The 11-S Kwik-Mix Dandie follows the general design of the previously announced 6-S and 16-S sizes. The tilted flow-line discharge chute, selective skip shaker, and the Kwik-Mix remixing drum are included in the unit. It has a rated capacity of 11 cubic feet of mixed concrete plus 10 per cent, and meets AGC specifications. The 11-S is available in side or end-discharge models on a 4-wheel chassis, or end-discharge on 2 wheels.

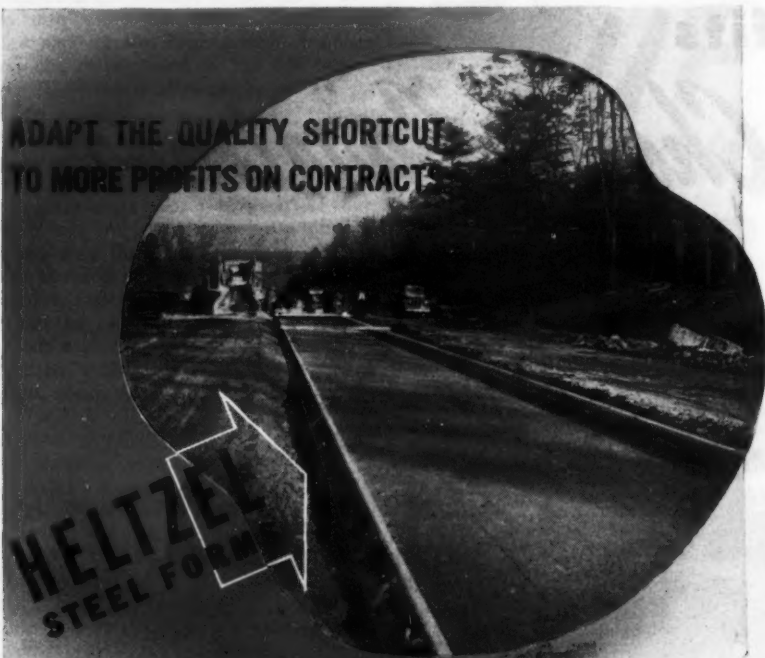
Further details can be obtained by

CONTRACTORS AND ENGINEERS MONTHLY readers who write direct to the manufacturer and mention this news item.

Pipe-Measuring Gage

Pipe and conduit in sizes ranging from 1/8 inch to 12 inches can be measured with a 3-point gage which determines the size of the pipe and tells the correct drill size for tapping. It is pocket size, made of steel finished with black rustproof finish, and has numerals etched in white. The gage also has an inch and metric rule.

A descriptive broadside giving further details can be obtained on mention of this notice. Write the Three Point Gage Co., 3767 No. Racine Ave., Chicago 13, Ill.



There's a big difference between profit and loss when you can strip, move in and get set for another job without costly reconditioning. You can do it easily and quickly with Heltzel Steel Forms... without fuss or fuming.

The value of your Heltzel Forms increases with each additional mile of completed paving. You'll cheer these lower maintenance and conditioning costs.

Vibration or jarring cannot bother Heltzel Forms... thanks to a non-clogging, single wedge stake pocket, one of the many exclusive Heltzel features.

Remember, Heltzel builds it better.

Place your order for Steel Forms now. If you delay, steel may not be available, and we will be unable to make delivery on time.

Profit Information Here



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BINS, Portable and Stationary
CEMENT BINS, Portable and Stationary
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FINISHING TOOLS FOR CONCRETE ROADS



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The discharged veteran wears this emblem. Remember his service and honor him.



C. & E. M. Photo
Steel sheet piling for the new sea wall at Narragansett, R. I., was driven by a Vulcan 5-ton hammer.

Sea Wall

(Continued from page 1)

development project along Ocean Road, Narragansett, in Washington County, where the great hurricanes of 1938 and 1944 caused severe damage to the sea walls and property in back of them. This particular section of the beach is owned by the Town of Narragansett, and extends for 1/2 mile from the southerly extremity of this new wall northward to the private beach of the Dunes Club. With the completion of this construction, Ocean Road, U. S. 1, which follows a parallel course at this point only 30 feet west of the wall, is now protected from high seas and all that goes with it.

At times, especially in the winter, the waves have piled debris on the concrete pavement, and during the two large hurricanes within recent years the water stood several feet deep across the highway. When it receded, a foot of sand remained on Ocean Road, together with many huge boulders that had been washed in from the jetties. Not only will the new concrete structure protect this scenic drive, but it will also keep

the beach in front of the wall in place and prevent erosion. Twenty-five years ago this area was occupied by privately owned restaurants, bath houses, etc., which were protected by an old masonry wall that gradually got covered over by sand in the course of time, exposing the buildings to the fury of the sea when it went on a rampage. As the buildings deteriorated they were abandoned, and ten years ago the Town bought the site, put up a new 100 x 350-foot bath house, and operates this stretch of ocean front as a town beach.

Steel Sheet Piling

Trench excavation started at the south end of the job with a Marion crane using a 75-foot boom and a 1-yard clamshell bucket for the excavating. The material was thrown up in a dike between the trench and the sea, and served as an excellent barrier in protecting the work, especially when the winds were blowing from the southeast, the quarter from which high waves usually break on the coast. The trench

was dug to the average dimensions of 10 feet wide and 10 feet deep, with shoring following right behind the clamshell digging. This shoring consisted of 12 x 12-inch timbers, 20 feet long, placed in a row at the bottom of the trench on the side near the ocean. Each length of timber was cross-braced with two 8x8's butting against planks set vertically at the opposite side of the trench. This cribbing served a two-fold purpose: first it prevented the shifting sands from sliding down and spoiling the configuration of the newly made excavation, and second, the straight line of 12 x 12's was a guide in driving the sheet piling which was to go along the ocean face of the wall footing. In order to get a good line for the piles, a section of trench 60 feet long was usually dug and braced with cribbing before the driving started.

In addition to the bottom bracing, another row of 12 x 12's was laid on top of the ground along the ocean side of the trench, a foot or two back from the edge. Every 20 feet this line of timbers was cross-braced with a 12-inch pile,

from 10 to 14 feet long, with its other end buried in the sand on the highway side of the trench. The sheeting was driven between these two rows of timbers, one in the trench at the bottom, and the other outside the trench at ground level. This was a further aid in getting a straight line for the sheet piling.

The piling was driven in 60-foot sections at a time by the same crane that had done the excavating, but equipped with a Vulcan 5-ton hammer working on compressed air furnished by two compressors hooked up together, a Sullivan 360-cfm and a Schramm 300-cfm. The row of piling being driven was first tapped lightly in the ground for the length of the section to insure good alignment, and then the driver moved back over the row and drove the piles to grade with an average 1/4-inch movement of the piles at each blow until elevation plus 4.0 had been reached. It was expected that the piles would have to be cut off at that grade, but as the

(Continued on next page)

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FIRST in Portability

FASTEST Set-up

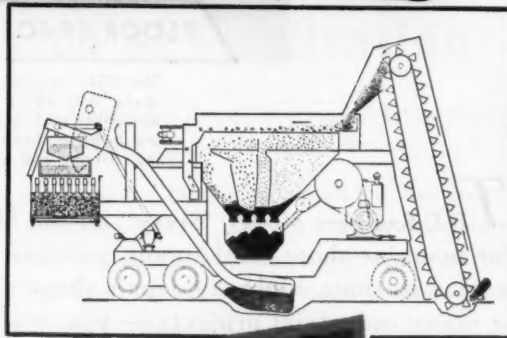
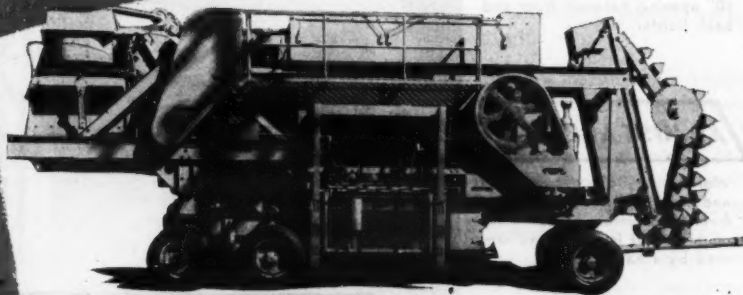
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A SUPER-PORTABLE BATCH TYPE ASPHALT PLANT

—THE MODEL F

● Yes, sir—here it is—the Model F—a 2500-lb. batch type portable asphalt plant that you can set up and get into operation in a matter of minutes. The only part that has to be raised is the folding elevator. Twin-shaft, 2500-lb. capacity pug mill, 36"x10' triple-deck horizontal Cedarapids Symons screen, 4-compartment (6 batch) hopper, 25 cu. ft. batcher, 2500-lb. springless dial scale, 25 cu. ft. skip hopper, and steam-jacketed pump are in place at all times. Ground level charging hopper assures quick, easy loading. Pug mill discharges directly into trucks thereby eliminating troublesome delivery conveyor belts. Operator's platform on the ground level makes possible one-man control of all operations. Offered with a choice of gas, diesel or electric power, with or without a drier for hot or cold mixes.

The Model F is the ideal plant for paving contractors, counties, and state highway departments. It grades the aggregate, weighs the material, mixes it to suit specifications, does it better and satisfies the most rigid inspection. Get the details today.



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Sea Wall

(Continued from preceding page)

driving was so uniform, positive, and well controlled in the packed sand the grade was reached precisely.

The pile sections used were M-112 23-pound, 16 inches wide x 12 feet long, and the availability of this material was one of the chief concerns of the contractor. Some of the piling was shipped by rail from Pittsburgh steel mills to West Kingston, where it was unloaded and hauled the remaining 7 miles to the job by the contractor's trucks. Not enough was received in this manner, however, and in order not to hold up progress on the work, trucks were sent over 200 miles to New Jersey to bring back sheeting which was available there.

Solid Foundation

As the concrete footing for the wall was to be poured against the sheet pil-

ing, some form of tie was deemed necessary to bond the concrete to the steel and prevent the piles from being lifted by any undermining action of the waves. For this purpose a 1-foot-long section of 5-inch 8J-pound steel rail was welded to each pile at a point that would be in the center of the 3-foot-deep concrete footing. Two 3/8-inch fillet welds, 4 inches long and 8 inches on centers, done with an electric welding machine were used to join the rail to the pile.

When the sheeting was driven, the bottom cribbing was removed to make room for the driving of creosoted piles, some oak and the rest pine, to serve as a foundation for the sea wall. These piles averaged 8 inches at the tip, 12 inches at the butt, and were 10 to 14 feet long with a bearing load of 32 tons per pile. They were driven 4 feet on centers in two rows, one row being 18 inches inside the front or ocean side of the footing, and the other row 24 inches from the back of the footing. The same crane and hammer used on the sheeting

drove the wooden piles, with a pile head replacing the sheeting head on the hammer. The piles were then cut off so that they would project 1 foot into the footing.

The dimensions of the wall and its footing were not the same for the entire 478 feet of the structure. Slight variations were the result of changing topography at the north end, but for the southerly 60 feet the wall and footing were built on a larger scale to match the design of the existing wall at that end. The 3-foot-thick concrete footing varied from 6 feet 4 inches to 7 feet 6 inches wide for the northerly 418 feet, and had a uniform width of 8 feet 9 inches for the lower 60 feet. The wall too varied in height and base width accordingly. At the northerly portion, the height ranged from 6 to 7 1/2 feet with a base width of 3 feet 4 inches to 4 feet 6 inches, while for the shorter southerly stretch of wall the height is 9 feet 9 inches with a base width of 6 feet 6 inches.

(Concluded on next page)

RODGERS "Sixty" SHOP PRESS

MOVEABLE CYLINDER

Cylinder is adjustable completely across top bolster—mounted on four rollers that ride on the bolster channel. Ram travel 2 1/2" per stroke of pump. Cylinder detaches from press and with added hose may be used as a jack, clamp or press in any position.

WIDE WIDTH — 45"

Working space on bolsters (45") permits the entrance of large gears, wheels or pulleys. 10" opening between front and back bolster.

ADJUSTABLE 8" to 38"

Working daylight between top and lower bolster adjustable from 8" minimum to 38" maximum. Bolster is raised and lowered by a hand crank.

FLOOR SPACE ONLY 38"x70"

The "Sixty" requires small amount of floor space, only 38" x 70". Performs many operations such as: pressing, straightening, bending, shearing, clamping, broaching, riveting and assembly work.

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saving uses

END OPENING — 8"

Long work may be slid through either end of the press without encountering any obstructions. The opening between the columns is a full 8".

HANDY VALVE & GAUGE

The hydraulic gauge marked in pounds and tons and the quick opening valve are located at the right side of the press, above the hydraulic pump, for convenience of the operator.

2-SPEED PUMP

2-Speed pump, sturdy and simple, self lubricating, needs no attention. Ram moves 2 1/2" each stroke of pump when pump is set for high speed—giving up to 2,000 lb. pressure in rapid travel. Flip of lever changes pump to high pressure.

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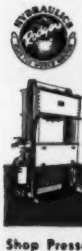
... are described in this catalog. Included are the Rodgers 100 ton and 150 ton Shop Presses, and the Rodgers Portable Universal Press. Write for your copy.

THE Rodgers Model "Sixty" 60 ton Shop Press is ideal for machine shops, tool rooms, garages, tractor or farm service stations, highway repair shops and repair plants or many industrial projects—you will find that one or more in your shop is a good investment that will pay dividends quickly. It is also available in a special size with a daylight opening from 8" to 48".

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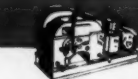
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PORTABLE
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Eliminate the use of unsanitary pails, kegs, dippers or cups, and protect the health and strength of your workmen on jobs where fresh, clean and cool drinking water is not permanently available... Save payroll losses by keeping your men on the job! The Dobbins Portable Drinking Fountain does all this by providing protection from disease, colds, etc., which may otherwise be spread with the use of a "common" drinking cup or dipper. Inner water container and bubbler parts made of corrosion-proof stainless steel or plated brass. Fully insulated to keep water fresh and cool. Four gallon capacity. A few strokes with the pump supplies compressed air for instant flow of water at the press of a button. Meets requirements of Public Health Authorities!

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Salt Tablets Dispenser, 500 tablet capacity, extra **\$2.75**
Adjustable, Waterproof Carrying Strap, extra **\$3.00**
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Dobbins
Superbilt **PORTABLE DRINKING FOUNTAIN**

WEAR A
BUDDY
POPPY

VETERANS OF FOREIGN WARS OF THE U.S.

Sea Wall

(Continued from preceding page)

Forms and Concreting

In constructing the concrete footing the steel piling was used as a form for the front face, while for the rear footing form the contractor used two sets of Blaw-Knox steel curb forms, 20 inches high x 10 feet long, bolted together one above the other to make a single form 40 inches high, providing ample room for the 3-foot-deep footing. Four bolts, $\frac{1}{2}$ x 2-inch, held the two forms securely together. About 100 feet of trench was pumped dry at a time to accommodate the form building by constructing a small earth dam at each end and removing the water by a Jaeger 4-inch pump.

Concrete in the footing and wall was a 1:2:4 mix using washed gravel for the coarse aggregate. The ingredients were dumped dry into a fleet of six Smith 4-yard truck-mixers at the Gammino Construction Co. ready-mixed concrete plant at Providence. The truck-mixer fleet also is owned by the contractor. As the haul was 33 miles, no water was added at the plant, but when the job site was reached 6 gallons of Insuro, a six-way liquid chemical, was added to the drum of each truck-mixer along with the additional water that was required and the whole mixed for 5 minutes. Used at the rate of one quart for every bag of cement, Insuro is said to have the ability to accelerate the rate of hydration of portland cement, thereby producing stronger concrete at an earlier date. The properties attributed to this chemical, viz., waterproofing, quick-setting, hardening, dust-proofing, intensifying, and also an effective anti-freeze, were needed in this sea-water construction which took place in cold weather.

The concrete was chuted into the forms. No vibrating was done, and 12 hours after the pour the steel forms were lifted out by the crane and moved along to a new location. The reinforcing steel used on the job was purchased from the Bethlehem Steel Co. which delivered it to the site in its own trucks hauling from its Boston yard.

Building the Wall

After a stretch of footing was ready, work began on the wall proper with the setting of the granite facing at the front of the wall. This stone front averages 5 feet in height, 30 inches wide at the base and 16 inches at the top, and was purchased from the Sullivan Quarry, 25 miles away at Westerly, the quarry making the delivery in its own trucks. The granite usually came in large chunks about 4 feet long and 1 foot wide and thick, necessitating its being broken up into smaller sizes, specially for use in the upper courses. Most of the stone was broken by hammer and chisel, but on some of the larger pieces holes had to be drilled into the granite, followed by driving steel wedges to cause a cleavage. Sand-cement mortar was used to bond the stone together. The large pieces of granite were transferred from the ground to the trench by means of a Lorain truck crane with a 45-foot boom, mounted on a Mack truck, as the four masons building the wall called for the material.

With the exception of the two end sections the wall was built in 20-foot segments and has a $\frac{1}{2}$ -inch premoulded non-extruding joint filler placed between adjoining sections. The masonry facing served as a form for the front of the wall, but the rear form was made of $\frac{3}{4}$ -inch boards, held in place with 2 x 4-inch studs set on 16 inch centers, and a double 2 x 6-inch wale every 2 $\frac{1}{2}$ feet. Williams $\frac{1}{2}$ -inch threaded tie rods were passed through the interstices in the masonry to the wood form in the

rear so that the wall would have the exact width required. Alternate 20-foot sections were poured by the truck-mixers, as was the footing, the concrete being chuted into the forms.

The top of the wall is surmounted by concrete coping or parapet, 21 inches wide and 30 inches deep, with a $\frac{1}{2}$ -inch open joint every 20-foot section, which is an integral part of the wall. At the rear of the wall and at the same elevation of the top proper, a new concrete sidewalk will be constructed this spring, 12 feet wide and 4 inches thick, made up of a 3-inch base course of 1:2 $\frac{1}{2}$:5 concrete and a 1-inch top course of 1:2 cement-sand mortar. This walk will be laid on an 8-inch granular base course.

Backfilling was done around the sides of the wall by a Caterpillar D4 tractor-dozzer, and surplus material was bulldozed into the ocean during December. Debris will be removed by a crane in the spring.

Quantities and Personnel

Work on this contract started in

August, 1945, engaging a force of 14 men including 2 crane operators, 2 oilers, 2 carpenters, 4 masons, and 4 laborers. It was suspended on December 13, 1945, and will be completed in the spring. The major quantities were:

Unclassified excavation	2,585 cu. yds.
Steel sheet piling	5,700 sq. ft.
80-pound rail anchors for piling	476 lin. ft.
Timber piles	5,060 lin. ft.
Concrete masonry	1,020 cu. yds.
Steel bar reinforcement	37,251 lbs.
Stone masonry	230 cu. yds.

For the M. A. Gammino Construction Co., Joseph Hemberger was Superintendent, while William F. Allen was Resident Engineer for the Rhode Island Department of Public Works. The project was under the direction of the Division of Roads and Bridges which is headed by George H. Henderson, Principal Highway Engineer. Lee V. Spencer is Construction Engineer and Frederick W. Hauck is Designing Engineer.

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ALL TYPES AND SIZES

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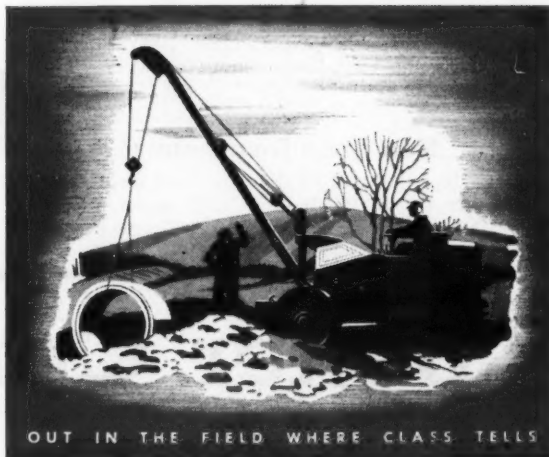
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HISTORY* . . . For a full generation Chrysler-powered vehicles, vessels and equipment have established new standards of performance—a new excellence of quality resulting from time-tested principles of power application.

Chrysler Industrial Engines, in many types of equipment, have registered, out in the field where class tells—new economy, efficiency and longer life over extensive periods of continuous operation.



OUT IN THE FIELD WHERE CLASS TELLS

Definite proof of the outstanding performance of Chrysler Industrial Engines is their approval and acceptance by over 150 end product manufacturers to power 35 different types of equipment.

These versatile engines are designed, engineered and built completely in the great Chrysler plant. This brings a new excellence of quality—"Horsepower With a Pedigree" to users of industrial power.

* One of the 8 character points in the Chrysler Industrial Engine Pedigree

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Year in and year out Chrysler Industrial Engines continue to deliver efficient and economical power to owners in many different types of applications.

Chrysler first developed high compression flexible horsepower—adapted it to industrial power use. Then Chrysler engineers cooperated closely with powered equipment manufacturers—coordinating engine and end product for greater efficiency and economy.

These basic principles of industrial power application

have stood the test of thousands of hours of operation in the most rugged types of service.

As a result, Chrysler Industrial Engines are providing dependable low cost power for tractors, cranes, shovels, draglines, pumps, air compressors, generator sets and other applications in construction.

Attention Dealers: Some desirable Chrysler Industrial Engine territories are available. Write to the Chrysler Industrial Engine Division for complete information.

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Horsepower with a Pedigree



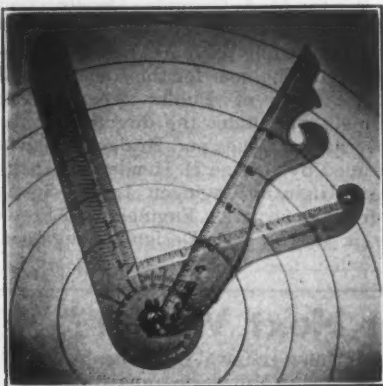
Industrial Engine Division, Chrysler Corp.
12201 East Jefferson, Detroit 31, Michigan

Please send the Chrysler Industrial Engine Catalog.

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Address _____

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This new drawing and measuring instrument of Tenite plastic is designed to do eight different jobs.

Drawing-Measuring Device for Many Jobs

Eight different drawing and measuring instruments are built into one unit in a new device molded from Tenite by Precision Plastics Co., Philadelphia, for Parva Products Co. The instrument is said to be equally suitable for draftsmen, architects, mechanics, carpenters, and students.

Molded in two parts, a combination square and a removable miter arm, the tool is designed to serve as square, dividers, protractor, triangle, ruler, French curve, or miter. Made of transparent yellow plastic, Tenite, produced by the Tennessee Eastman Corp., the tool is said to maintain high accuracy and withstand rough treatment to provide long service life.

Readers of *CONTRACTORS AND ENGINEERS MONTHLY* can receive further details and prices by writing the Parva Products Co., West Haven, Conn. Mention this report.

Dense Tar Surfacing Studied in England

In the course of an investigation made primarily to evolve a tar surfacing material capable of withstanding fast-moving and turning military tanks, dense tar surfacings of the stone-filled rolled bituminous type were laid experimentally in Surrey, England, according to an article in the London *Surveyor* and reported in a recent issue of *Highway Research Abstracts*. The practical work was carried out concurrently with investigations at the Harmondsworth Road Research Laboratory to develop satisfactory principles of design for such surfacings.

Surfacings conforming to three different specifications were prepared: good slag aggregate, $\frac{1}{2}$ to $\frac{3}{4}$ -inch; coarse washed river sand, $\frac{1}{8}$ -inch to 200-mesh; and limestone filler, less than 200-mesh; with a high-aromatic tar having an equi-viscous temperature (evt) of 50-60 degrees C. Original specification requirements were as follows: (1) 35 per cent stone, 50 per cent sand, 15 per cent filler; binder, 50 degrees C evt, 7.5 per cent; (2) 38 per cent stone, 50 per cent sand, 12 per cent filler; binder, 50 degrees C evt, 8 per cent; (3) 50 per cent stone, 38 per cent sand, 12 per cent filler; binder, 50 degrees C evt, 6.5 per cent for trunk roads, 7.0 per cent for city streets.

The materials were mixed in a modern low and medium-temperature asphalt plant which had accurate weighing devices for aggregate and binder. The aggregate was heated to the required mixing temperature of 200-250 degrees F, and the plant operation closely controlled. The mixed material, which was tipped on delivery at the site, was wheelbarrowed into position, spread with heated forks at a rate of about 10 square yards per ton, giving a compacted thickness of 2 inches, and rolled, usually by a 10 to 12-ton steam roller, but a 6 to 8-ton reversing roller is considered preferable.

On some roads the material was laid

directly on the unprepared existing surface; on others the original surface was first reshaped by burning off or scarifying and re-rolling. The effects of certain variations in composition on the performance of the surfacings were compared with the findings of the laboratory investigation.

The following main conclusions are drawn from the work:

(1) Although insufficient time has elapsed to enable the ultimate life of the surfacing to be estimated, the results so far indicate that dense tar surfacings can form a satisfactory road surface for the heaviest traffic, including military tanks.

(2) The characteristics of the filler used have an important effect on the properties of the surfacing. The full-scale work confirmed the laboratory conclusions that (a) although for maximum resistance to deformation the proportion of filler must be above a certain minimum, no advantage is gained by using a filler content greater than 30 per cent of the filler-sand mixture, and (b) an important indication of the value of a filler is given by its bulk density in benzene.

(3) The optimum binder content calculated according to the methods given by the Laboratory investigators corresponds closely to the content found to give on the road the surfacing most resistant to deformation. For normal traffic the binder content may with advantage be a little higher than the calculated optimum; with a binder content slightly below this optimum, the surfacing is more resistant to indentation, but may be unsatisfactory in other respects.

(4) The most suitable viscosity for the binder is 50 to 60 degrees C evt.

(5) The nature and the grading of the fine aggregate affect the binder content required by the mixture.

(6) For satisfactory results, thorough compaction during laying is essential, which may preclude the laying in winter, except by experienced labor, of surfacing containing binder of 60 degrees C evt.

New Lima Distributors

Appointment of the Stanley & Cadiogan Co. of Portland as sales agent in Maine for Lima shovels, cranes, and

draglines has been announced by the Shovel & Crane Division of the Lima Locomotive Works, Lima, Ohio.

Lima sales in Oklahoma will be

handled in the future by the Wylie-Stewart Machinery Co., 1400 Exchange Ave., Oklahoma City, the firm has announced.

YOUR MIX-IN-PLACE JOBS ARE DONE FASTER at LESS COST



WITH A

WOOD ROADMIXER

Here's why...

First: Lower costs per square yard or ton than any other method.

Second: Higher production, as much as 250 tons per hour of ready-to-spread mix.

Third: Two men can handle an average job.

Fourth: Only a tractor and supply truck are needed as auxiliary equipment, which can be used for other work when Roadmixer is not in use.

Fifth: First cost, operating and maintenance costs are less than for similar equipment.

Sixth: 14 years of user operation the world over prove its economy and long life.

Wood Roadmixers are now available for immediate delivery—see your local distributor or write direct for prices and literature.

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WOOD MANUFACTURING CO.

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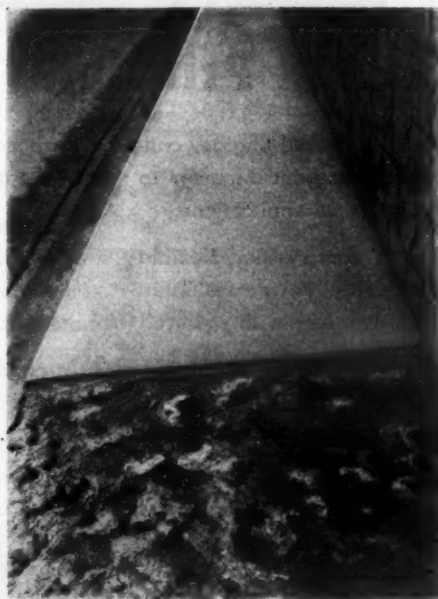
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INTERNATIONAL Pressure Vibrators

Pressure vibration insures harder, better concrete re-surfacing and repairing.

Other advantages of pressure vibration include greater strength—greater density—greater uniformity.

Usage covers roads, highways, buildings, tunnel floors, bridge decks and general industry.



• Lower part of picture shows condition of bridge sidewalk. Upper section shows sidewalk restored under pressure vibration. Picture taken during construction.

THE INTERNATIONAL VIBRATION COMPANY
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Also manufacturers of Standard Vibratory Units for General Concrete Construction—Foundries—Material Handling and Industrial Applications.

Auto Golden Jubilee

America's automotive industry will celebrate its golden jubilee in Detroit on May 31 to June 2. It was on March 6, 50 years ago, that Charles B. King rode around that city in the first horseless carriage. Two months later, June 4, his neighbor Henry Ford knocked down his shed wall to drive forth in the forerunner of a long line of Model T's and V8's.

To mark the golden jubilee of the auto age, the Automobile Manufacturers Association has published a bulletin "Automotive Golden Jubilee Facts". It features current articles about the

advent of the automobile, and a collection of photographs of the early cars on the road—as well as sometimes in the mud.

Colombia Needs Equipment

A lack of mechanical equipment is given as the chief reason for the slow progress of highway construction in the South American republic of Colombia, *Foreign Commerce Weekly* reports. It is estimated that during the past year 85 per cent of the nation's highway work was done by hand.

More than 25 per cent of Colombia's current highway appropriation is being

set aside to buy such items as rock crushers, rollers, hoists, graders, bulldozers, air compressors, rock drills, and dump trucks, as well as reinforcing steel and cement. This equipment expenditure is expected to amount to 450,000 pesos (\$250,000).

New ASTM Headquarters

Alterations are nearing completion at the new headquarters of the American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. The group recently purchased the building and has moved there from its smaller quarters at 260 So. Broad St.

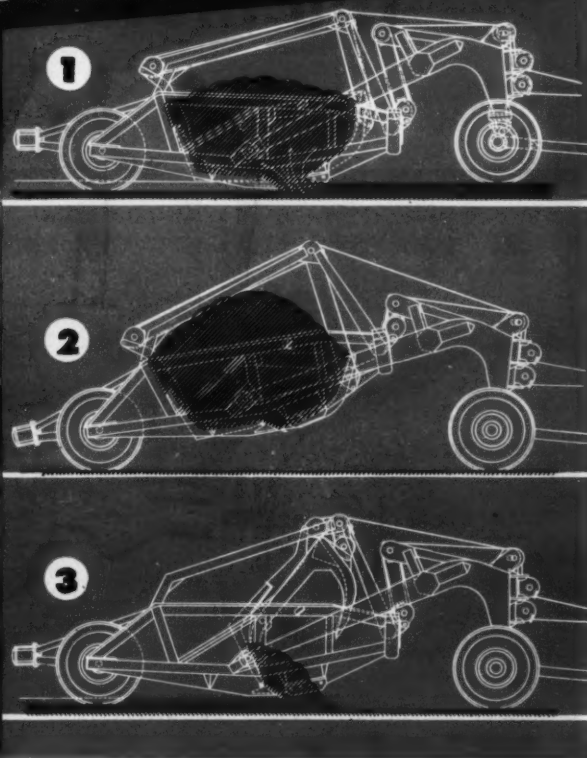
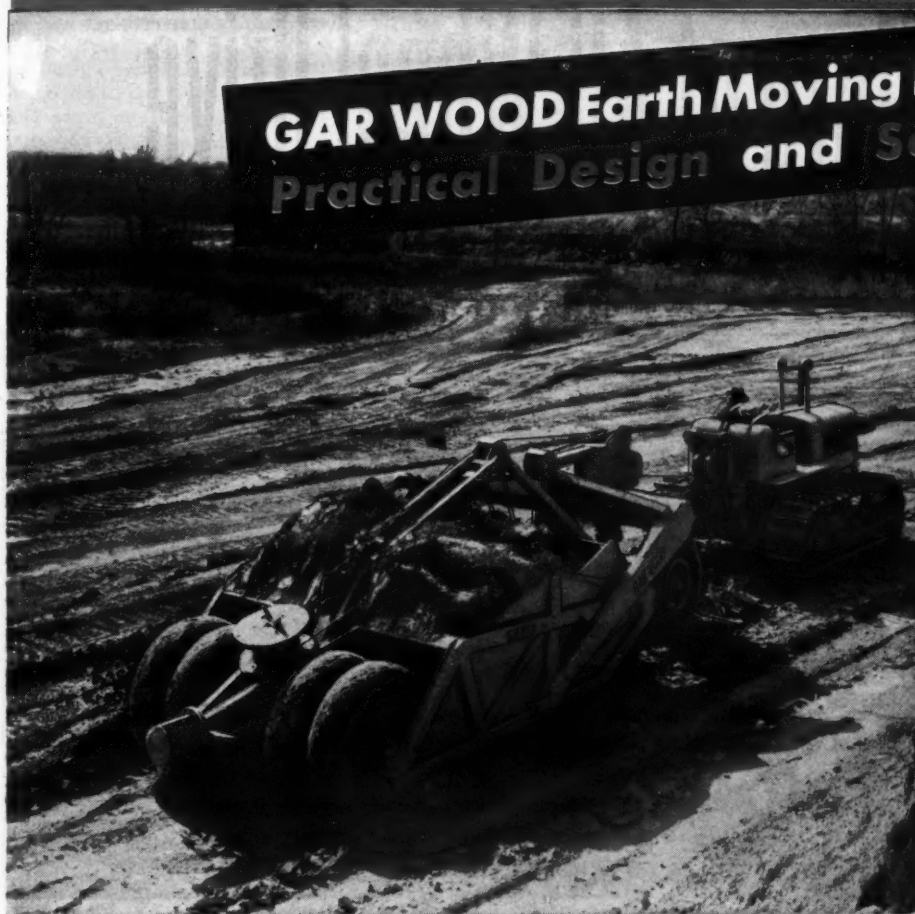
Paul Holland Dies

The designer of Wayne County's entire road system, Paul Holland, Chief Highway Design Engineer of the Board of Wayne County Road Commissioners, Mich., died last month in his fiftieth year.

A graduate of the University of Michigan in 1919 with a B.S. in civil engineering, Mr. Holland had held his post since that year. He had also been active in planning the John C. Lodge and Detroit Crosstown Expressways, the Wayne County airport, and other projects in the state. He was a member of the Highway Research Board.

Down-to-Earth Engineering

GAR WOOD Earth Moving Equipment Features Practical Design and Sound Construction



GAR WOOD 4-Wheel Cable Scrapers are *all scraper*, well engineered, honestly built of high quality materials, developed and proved over a period of many years—scrapers that *hold together* and get big yardage jobs done at consistently good speed with an absolute minimum of down time. Some of the many outstanding engineering features, as well as the rugged simplicity of the mechanism, are shown in the three drawings above:

1. **LOADING:** The self-loading is by positive digging to depths down to 12". "Boiling" action of dirt loads bowl and patented apron evenly by reason of proper angle of the cutting edge. Positive digging action is assured in all types of materials by proper location of draft point.

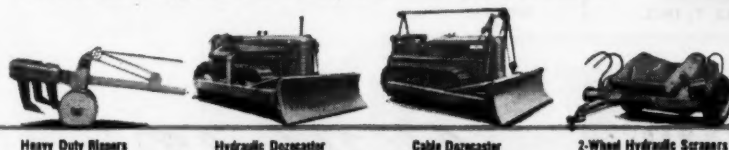
2. **CARRYING:** This position provides extremely high clearance of cutting edge, essential in traveling over uneven ground and in discharging sticky materials. Proper weight distribution with exceptionally low center of gravity assures stability—provides for maximum tire life.

3. **DUMPING AND SPREADING:** The first portion of the load dumps automatically when the apron is raised.

The remainder is forced out by *positive rolling ejection*. Note extremely large apron opening to facilitate this ejection of all types of materials. Cutting edge remains stationary throughout cycle, providing for even, *accurate control* of the spread by the heavy duty Gar Wood Cable Control Unit.

Contact your Allis-Chalmers dealer. He will be glad to show you Gar Wood earth moving equipment and arrange for you to see on-the-job performance in your locality.

**GAR WOOD
ROAD MACHINERY**
WITH ALLIS-CHALMERS DIESEL POWER



OTHER GAR WOOD PRODUCTS: HOISTS AND BODIES • TANKS • WINCHES AND CRANES • HEATING EQUIPMENT • MOTOR BOATS



Sold Through
ALLIS-CHALMERS
Dealers Everywhere

ROAD MACHINERY DIVISION
GAR WOOD INDUSTRIES, INC.
DETROIT 31, MICHIGAN



In response to calls for repair service, this Allis-Chalmers dealer in Oklahoma City dispatches tractor parts with its own plane.

Parts Service by Air

Service by air has been inaugurated by the Boardman Co., Oklahoma City's Allis-Chalmers tractor dealer. A converted BT-13 is being used by the firm to rush parts to stalled construction jobs

in its territory. One plane is now in service and more are planned. Harris R. Lunn, President of Boardman, believes that the initiation of air delivery of parts can greatly reduce lost time from equipment breakdown and therefore offers improved customer service.

High Construction Volume Predicted at ASCE Meeting

Always a barometer of America's prosperity, the construction industry today has a backlog of more than \$29,000,000,000, exclusive of individual housing units, indicating prosperous times are in store for the next five years, at least.

This forecast was made at the spring meeting of the American Society of Civil Engineers by Donald D. King, head of the King Advertising Services, New York, in an address before the construction division of the 93-year-old Society, oldest national engineering organization in the country. More than 1,000 leading civil engineers attended the three-day meeting last month in the Bellevue Stratford Hotel in Philadelphia.

Estimating national income at \$150,000,000,000 annually for the next five-year period, Mr. King predicted construction volume at the end of that period would reach \$15,000,000,000 annu-

ally, \$10,000,000,000 of engineering or heavy industrial and multiple-dwelling type, and \$5,000,000,000 of private housing type. He emphasized, also, that during the last half of 1945, the construction volume increased at a 61 per cent rate and that an increase of at least 50 per cent in construction volume in each of the next four-year period is anticipated.

"As long as construction volume remained within 10 to 15 per cent of the total national income range, we had a reasonably prosperous economy. Indications are that for the next five years, at least, the construction volume will be in that range," Mr. King said.

\$10,000,000 Start

The first two highway reconstruction lettings of the New York State Department of Public Works for 1946 resulted in successful bids for \$10,000,000 of work. Another \$140,000,000 of highway projects is planned for the balance of the year.

The Inside Story of All-Wheel-Drive



On the surface, Marmon-Herrington *All-Wheel-Drive* converted Fords may look very much like conventional trucks. But underneath there's a whale of a difference.

In place of the regular front axle, you'll find a sturdy driving axle that delivers live power and traction directly to the front wheels. You'll find also a rugged, dependable auxiliary transmission, that increases total number of speeds to 8-forward and 2-reverse. Thus, with an abundant flow of tractive power to *all wheels*, plus an exceptionally wide range of gear ratios, Marmon-Herrington converted Ford trucks are ready to transport maximum pay-loads—*wherever you want, whenever you want*—regardless of the most difficult conditions of weather and terrain.

Marmon-Herrington converted Ford trucks are mighty practical for regular highway work, too. *All-Wheel-Drive* power and traction gives them extra speed on hills and curves, greater safety on wet and slippery pavements.

Get the real performance facts on Marmon-Herrington *All-Wheel-Drive* Trucks—the big heavy-duty jobs as well as the Ford conversions. Ask any Marmon-Herrington dealer, or write the company direct.

MARMON-HERRINGTON CO., INC. • INDIANAPOLIS 7, IND.

ALL-WHEEL-DRIVE POWER AND TRACTION
UNEQUALED FOR CONSTRUCTION WORK



Marmon-Herrington *All-Wheel-Drive* converted Ford trucks have the rugged strength, power and dependability to carry the heavy loads and withstand the punishing service demanded in construction operations.

MARMON-HERRINGTON

All-Wheel-Drive

Crushed Lime Rock Used for Road Base

**Shipped 200 Miles to Job
And Laid in 8-Inch Layer
By Tractor-Dozers for
9.4 Miles of New Location**

IN the absence of suitable local material to use for a base course, Florida lime rock was shipped by rail 200 miles from Buda, Fla., for use on 9.4 miles of a new state highway near Brunswick in southeastern Georgia. The project is on State Route 27 beginning at its intersection with Ga. 32 about 10 miles west of Brunswick in Glynn County, and continues in a northwesterly direction towards Jessup to within a mile of the Glynn-Wayne county line.

This new location is parallel to and about 1,000 feet southwest of old State Route 27, which was constructed in 1927 with an 18-foot bituminous-macadam base that has since been resurfaced several times. Because high water from the Altamaha River, which lies about 4 miles to the northeast, had often flowed over the old road, the new grade was established at an approximately 5-foot higher elevation.

Another disadvantage of the old location was the single track of the Southern Railway running alongside the old highway which crossed the railroad twice. This was the main reason for building the highway in its new location, thereby getting rid of these two dangerous crossings. Another grade crossing had been eliminated with the construction of a highway overpass over the Seaboard Airline Railway line at Everett City near the north end of the construction where the new road swings back to meet the old. This overpass had been built as far back as 1939 along with three bridges where creeks crossed the new alignment. The road was not built at that time, however, for although three different contracts were let for its construction, the State stopped payment on two of the contracts, and the War Production Board shut down the third contract at the beginning of the war.

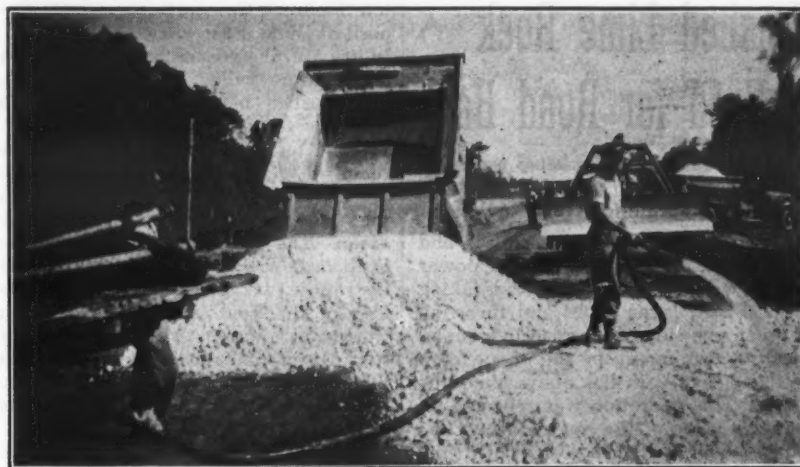
The recent contract included grading the roadway and building 5½-foot shoulders instead of 3-foot shoulders which was the width on the old road; laying an 8-inch compacted base course for a width of 23 feet; and paving this with a double bituminous surface treatment 22 feet wide. The State Highway Department of Georgia awarded a contract for this work to John Monaghan, Inc., of Pelham, Ga., on his low bid of \$238,366.68. Grading operations were started in November, 1944, and were completed early in 1945.

Road Grading

For the 9.4 miles of new location the grading was practically all fill which in

some cases over swampy areas was placed 7 feet high. In certain sections a gumbo soil was encountered which was removed to a depth of 18 inches by a 12-yard LeTourneau scraper pulled by a Caterpillar D8 tractor, and replaced with the same loamy material which was used in the fill. This material came from three roadside borrow pits, one about a mile beyond the north end of the job, and two smaller pits about mid-way of the project.

While the required borrow totaled 70,000 cubic yards, the station-yards of overhaul amounted to 3,760,000. The borrow pits were worked with a Lorain ¾-yard shovel which loaded ten trucks, eight International and two Chevrolet, with about 4 tons of material each. The fill was dumped on the grade and spread



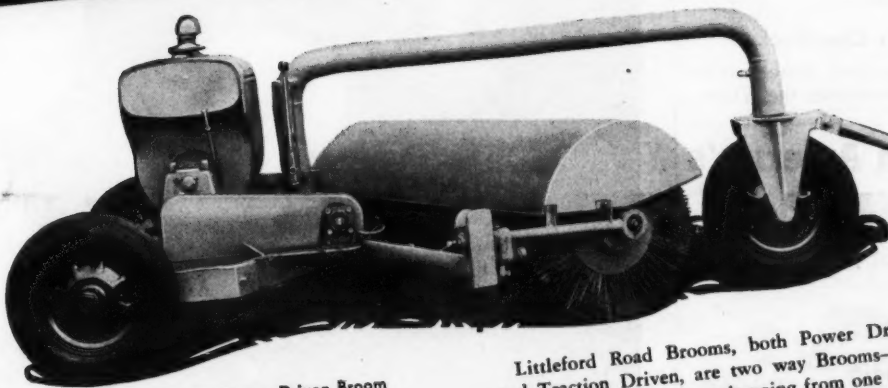
C. & E. M. Photo
A load of crushed lime rock is dumped on a highway in Georgia for use as a base. The rock was wet down with water from a 2-inch hose and spread by a Caterpillar RD6 with a 10-foot LeTourneau blade.

in 6-inch layers by a Caterpillar D7 tractor with dozer, while a similar tractor with a sheepfoot roller compacted

it. The borrow pits were excavated to a depth of 3 to 4 feet.

(Continued on next page)

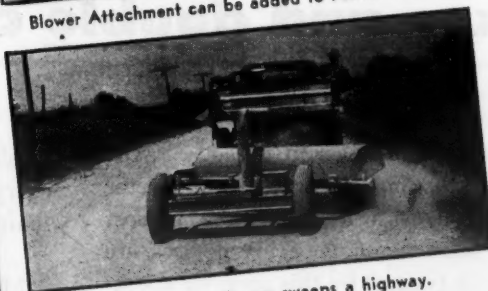
THESE LITTLEFORD BROOMS CAN BE CHANGED FROM ONE SWEEPING DIRECTION TO ANOTHER IN 2 MINUTES TIME



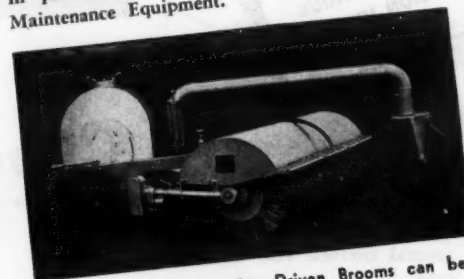
Littleford Model No. 108 Power Driven Broom



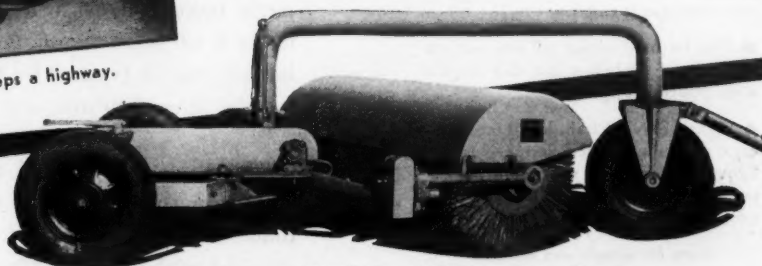
Blower Attachment can be added to Power Broom.



Traction Driven Broom sweeps a highway.



Both Power and Traction Driven Brooms can be equipped with a Sprinkler Attachment.



Model No. 106 Traction Driven Broom.

WON'T QUIT or cause time out



A Hayward Bucket keeps the job going ahead on scheduled time. It won't quit or cause time out.

The Hayward Company
32-36 Dey Street
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Hayward Buckets



LITTLEFORD

485 E. PEARL ST.,

LITTLEFORD BROS., Inc.

CINCINNATI 2, OHIO

Crushed Lime Rock Used for Road Base

(Continued from preceding page)

Earth Forms for Lime Rock

When the grade was all in place and leveled off, a Caterpillar No. 12 power grader went down half the road, taking off a 2-inch layer of fill and throwing it up on one side of the road to form an earth embankment in the shape of a wedge 1 foot 2 inches above the subgrade. This operation was repeated on the other side of the road, forming another earth wall between which the lime-rock base course was laid.

The usual procedure in laying this type of base course is to build wooden forms of 3 x 11's, supported every 5 feet by a stake, but because of the shortage of lumber and the men to set the forms these wedge-shaped earth embankments were built to retain the Florida lime rock. The difficulty of obtaining a smooth surface is increased with the use of the earth barriers since they give under the pressure of the graders and rollers used in shaping the base, while the wooden forms when securely anchored generally stay where they are put. Also, more base material was needed since the 23-foot width was measured to the bottom of the embankments which sloped back at a 1 on 1 angle, leaving a triangular space to be filled which would not be the case with vertical wooden forms.

Unloading the Lime Rock

The Florida lime-rock base-course material was purchased from the Willis-

ton Shellrock Co. which has a huge deposit at Buda, Fla., where it was mined. In its natural state the lime rock is hard and must be drilled, blasted, excavated, and crushed before it is loaded into railroad gondola cars for shipment. From 4 to 12 feet of overburden was removed to get at the deposit in which are imbedded many sea shells although the mine is now 50 miles from the ocean. The rock was shipped via the Seaboard Airline Railway 200 miles at the rate of twenty cars a day to two sidings of the Southern Railway. When work was going on at the north end of the project, the rock was unloaded at Everett City, but the bulk of it went to Zuta which is about 3 miles north of the south end of the job.

Here it was unloaded by a Lorain crane with a 30-foot boom and a Blaw-Knox 1-yard clamshell bucket. The siding was long enough to contain the twenty cars which were unloaded in the course of a 10-hour day. The crane worked along this string of cars, dumping the material into the same fleet of

ten trucks which was used in carrying earth for the fill, but in this operation the rented trucks were paid not by the hour but by the ton. Three laborers with hand shovels worked in each car as it was unloaded to make sure it was completely emptied. The lime rock met the following gradation requirements:

Sieve Size	Per Cent Passing
3-inch	100
3/4-inch	70
No. 10	0-10

Spreading the Base Course

In preparation for the base course, the subgrade received a final rolling by a Huber 8-ton 3-wheel roller, after which it was hand-tamped by a crew of from 6 to 8 men where extra sand had been added with a shovel, if necessary, to insure the grade being perfectly flat. Checking was done by two lute men using 2 x 6 boards on long handles. The grade was wet down with a hose and then the trucks were permitted to dump their material. Carrying about 7 tons of lime rock, the trucks unloaded side

by side on both halves of the road, spot-dumping at 6½-foot intervals which would give a loose depth of 11 inches of rock. The material was at once spread over the subgrade by a Caterpillar RD6 tractor with a light 10-foot LeTourneau bulldozer. As more trucks continued to dump, they backed over the spread lime rock, helping to pulverize and compact it, and kept off the prepared subgrade as much as possible.

Through traffic used the old road during the construction operations, but local traffic was permitted on the new location after the spreading of the lime rock.

Water Supply

The application of water plays a very important part in the laying of this type of base course, and as soon as the material hit the road from the truck it was wet with water supplied by a 2-inch hose from tank trucks. About 30 gallons of water a minute was used during the spreading operations, requiring the use

(Concluded on next page)

One Reason America's Highways Are Best!



● Made by Celotex, it is the approved modern expansion joint for all highway and general concrete slab construction work.

● Never extrudes. Compresses under pressure. Springs back when expansion pressure is eased.

● Can be used either of two ways—set flush or set below the slab surface with poured capping.

● Light—easy to handle. Makes concrete roads smoother, longer lasting. Proved by years of service in American roads—with "never a bump in a million miles."

Write for sample and complete information.

THE CELOTEX CORPORATION
Dept. CEM-5, Chicago 3, Illinois
World's Largest Manufacturers of
BITUMINOUS FIBRE EXPANSION JOINT



An optical comparator used to check gear thread profiles in the OLIVER "Cletrac" plant.

Check...and double check



It's fundamental at Oliver "Cletrac" ... the checking and double checking of all tractor parts before they are assembled. The most modern of testing and checking devices are in daily use as typified by this operator checking the thread profile of a gear.

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CLETRAC

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The OLIVER Corporation



Crushed Lime Rock Used for Road Base

(Continued from preceding page)

of three Ford tank trucks, two holding 1,000 gallons and the other 500 gallons. Water for the trucks was taken by Jaeger 3-inch pumps from a creek, and also from the old borrow pits which were filled with rain water. More water was added as the lime rock was graded and rolled.

After the tractor-dozers spread the material over the subgrade, it was shaped by Caterpillar No. 12 power graders, of which there were four on the job, and then rolled by two 10-ton 3-wheel rollers, a Huber and a Buffalo-Springfield. Then a grader with a 6-tooth scarifier, 9 inches between teeth, broke up the top 4½ inches of the base by making seven trips up and down the road, lapping a foot each time to be sure that no streaks of compacted material were left. The broken-up base course then received more watering from 12-foot spray bars on the back of the tank trucks.

Blading Operations

Following the wetting down, a grader started blading the loosened lime rock, moving the material from half the road to form a windrow at the side, and then repeated the maneuver on the other half of the road. The next step was to spread the rock back again evenly over the entire 23-foot width, and to put the heavy rollers to work breaking up any lumps that still remained, after which the graders bladed the surface to a 1¾-inch crown. These successive operations of scarifying, moving the lime rock back and forth across the road, and heavy rolling were done to insure the base being fully compacted and consolidated, resulting in a smooth hard surface.

The blading did not stop then, but continued for a period of from three to five days during which 1 inch from the top of the base course was moved along the surface of the road by the power graders, followed by the rollers, to fill in any low spots or breaks in the rock. This depth was reduced on the next pass to a ¾-inch blading over the entire width, followed by steel-wheel rolling, and then pneumatic-tire rolling. During all these operations water was sprayed on the base as needed. An average of 1,000 feet of full-width base course, including all rolling and blading, was done in a 10-hour day.

Surface Treatment

The completed sections of the base course were allowed to set for fifteen or thirty days, during which time traffic was permitted over the full width, and then the graders went over the road with their blades tilted forward, making just enough contact to remove the hard glaze from the surface of the solid lime rock in preparation for a bituminous prime coat. This consisted of an application of RT-2 tar sprayed for the full width at the rate of 0.25 gallon to the square yard, penetrating to a depth of ½ to ¾ inch. A light coat of sand was cast from trucks with hand shovels over this surface to blot up the excess bitumen, while the road was closed for two to four days.

Traffic was then allowed on the road for ten days, after which the first of the double bituminous surface seal coats was laid 22 feet wide, leaving a 6-inch border of white lime rock at each edge. This seal consisted of an application of AC-15 asphalt of 115-200 penetration at the rate of 0.39 gallon to the square yard which was covered with 50 pounds of No. 4 slag to the square yard. After traffic was allowed over this for fifteen days, a second surfacing was put down with the same grade of asphalt applied

at the rate of 0.25 gallon to the square yard. The top cover coat was 22 pounds of No. 6 slag to the square yard. The gradation of the two kinds of slag was as follows:

Sieve Size	Per Cent Passing No. 4	No. 6
1-inch	100	.....
¾-inch	95-100	100
½-inch	.....	95-100
¼-inch	0-15	25-75
No. 4	0-3	0-8
No. 8	.....	0-3

Quantities and Personnel

A crew of 60 men finished the 9.4 miles of grading, base course, and surface treatments by the middle of September when the road was officially opened to traffic. This force comprised 4 in the administrative branch, the superintendent, 2 foremen, and a time-keeper; 5 equipment operators, tractor, grader, and roller; 14 truck drivers; and 37 laborers.

The major items in the contract were:

Earth fill	70,000 cu. yds.
Lime-rock base course	128,890 sq. yds.
AC-15 asphalt	86,307 gals.
No. 4 slag aggregate	3,086 tons
No. 6 slag aggregate	2,163 tons

The work was done in Division 5 of the State Highway Department of Georgia, of which D. D. Hankins is Division Engineer. C. P. Chapman was Resident Engineer on the project. V. C. Bunn was Superintendent for the contractor, John Monaghan, Inc., of Pelham, Ga.

New Automatic Sprayer For Curing Compound

In an attempt to eliminate guesswork when spraying concrete-curing compound, the Flexible Road Joint Machine Co. has developed an automatic spraying machine. This unit, the Flexplane, is said to double-spray each square foot of surface with an even film.

The Flexplane spraying machine is built in two sizes, single-lane and double. Single-lane machines are adjustable from 10 to 12½ feet, and the two-lane units from 20 to 25 feet. The machine operates on the principle of advancing a spray nozzle in a zigzag course. A gasoline engine delivers the curing compound under pressure to the nozzle, and also propels the machine.


This new machine is described in literature which readers of CONTRACTORS AND ENGINEERS MONTHLY can obtain by writing the Flexible Road Joint Machine Co., Warren, Ohio.

New Type of Solder

Three independently filled cores of rosin flux feature a new solder which is said to produce faster work, eliminate the possibility of dry joints, and save tin. Premature sweating out of flux is precluded by the special design, the maker says. Tri-Core solder exceeds


ASTM Class A specifications and is available in all alloys, flux percentages, and gages.

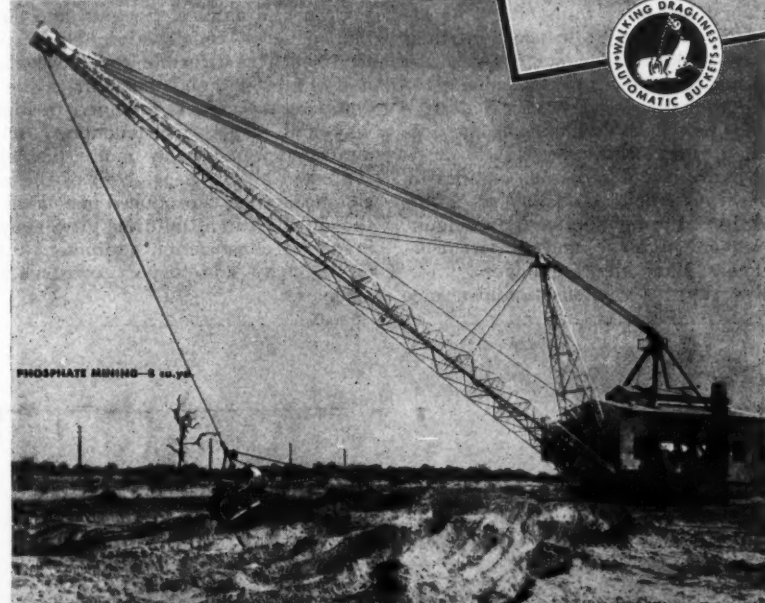
Bulletins and engineering test samples of Tri-Core solder are available from the Solder Development Division of Alpha Metals, Inc., 369 Hudson Ave., Brooklyn 1, N. Y. Just mention this news item.



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Safety on Highway And Airport Jobs

Frequency of Accidents In This Field Can and Must Be Prevented; Safety Is Concern of All

† MORE than 60 per cent of the accidents occurring in highway and airport construction can be prevented, W. R. Macatee, Manager, Airport Division, American Road Builders' Association, said at the Sixteenth Annual Safety Conference of the Greater New York Safety Council.

Highway and airport constructors are no more and no less aware of their responsibilities in lessening accidents than contractors in other fields of the construction industry, Mr. Macatee stated. Most highway and airport builders are eagerly anxious to look after the welfare of their fellow men, and they strive to make construction better, from a humanitarian standpoint, when they leave it than when they found it. This attitude is due partly to concern for their fellow workers. The smart ones also take measures to prevent accidents because they know a low accident frequency pays cash dividends by the prevention of financial losses due to property damage and repair of equipment, and through delay and loss of equipment forced out of service by accidents. Moreover, highway and airport constructors, like other employers, know that workmen's compensation insurance

rates are determined by the accident-history on their jobs; the lower their accident frequency and severity, the lower will be the cost of their compensation insurance.

Realistic contractors and others in the highway and airport field realize the relatively poor position the construction industry occupies with respect to "Frequency" and "Severity" of injury rates. In consequence of this, accidental deaths in all construction represented nearly 20 per cent of accidental fatalities in all industries in 1940. Against that admittedly poor showing, the workers in the construction industry accounted for only 6 per cent of workers in all industries.

Organized measures to prevent accidents in construction can be made effective. The War Department's move to cut down on accidents during the rush period of war construction in the years 1941-42 resulted in a 39 per cent reduction in accident frequency during 1942 over 1941, after the Army Corps of Engineers established its Safety and Accident Prevention Branch, although the exposure of workers was, perhaps, quadrupled.

Causes of Accidents

Cranes, draglines, tractors, and similar general construction equipment have been responsible for more than half of all lost time from injuries due to equipment accidents involved in highway and airport construction. Accidents attributable to motor vehicles represent about 25 per cent of the accidents, and have produced one-third of the days lost in all injuries to workmen involving construction equipment used on highway and airport construction projects.

Causes One-Third of Loss of Time

It is therefore desirable to analyze accidents resulting from the use of motor vehicles. Authorized or unauthorized riding of trucks by workmen represents nearly one-third of these accidents. Backing without proper warnings also ranks high, 18 per cent. As one might expect, accidents incident to the use of motor vehicles while in motion accounted for 70 per cent of the accidents; the balance (30 per cent) occurred while motor vehicles were standing on highway and airport construction jobs.

Truck Accidents Resulting in Lost-Time Injuries	
Accident—Vehicles in Motion	Per Cent of All Truck Accidents
Riding trucks	28
Backing—no signal	18
Bad road conditions	7
Getting on and off trucks	5
Walking wrong side of road	4
Defective brakes, lights, etc.	3
Loading and unloading	3
Other (repairing, coupling, etc.)	2
	70
Accident—Vehicles Standing	
Getting on and off	10
Loading and unloading	8
Repairing	6
Other (Cranking, repairing, tires, etc.)	6
	30

Keeping in mind that motor vehicles are practically indispensable in airport and highway construction, and since they are responsible for one-third of the lost time due to accidents on such construction, it is well to check the factors which lead to such accidents. Nearly one-half, 47 per cent, is due to carelessness of individual riders. However, management cannot escape its part of the responsibility. Had proper seating arrangements been provided, many of the accidents listed would not have occurred.

Factors in Accidents to Riders	Per Cent
Conditions	
Standing up, on sides, end, running board	17
Holes, ditches, soft shoulders	16
Sitting on side, end, or improvised seats	14
Defective stakes, guard rail, or sideboard	10
Driving too fast on curves, over rough surface	10
Starting or stopping suddenly, no warning	8
Load not secured	7
Unauthorized riding	7
Failure to stop or slow at intersections	3
Driving too close to other vehicles or buildings	2
Driving under overhead wires, too near embankments	2
Other causes	4
	100

(Concluded on next page)

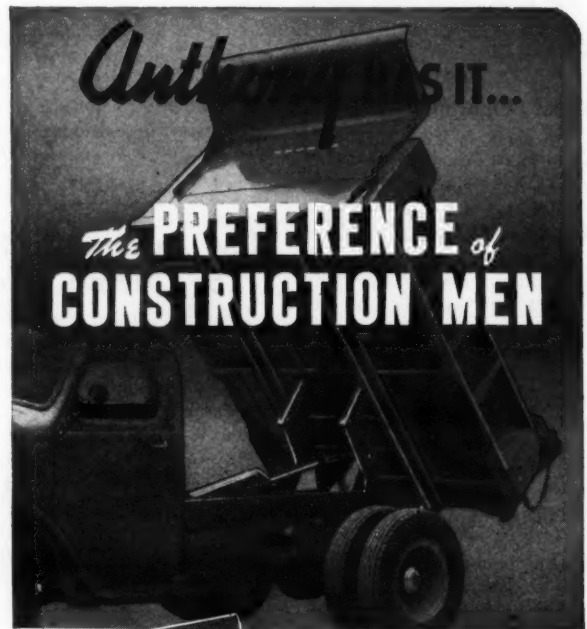


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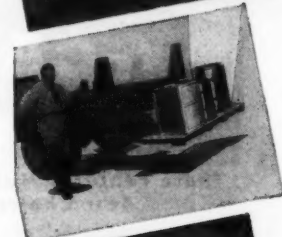
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Safety

(Continued from preceding page)

Failure to give proper warnings or signals is responsible for about one-fifth of the accidents incident to the use of all mechanical equipment on airport and highway construction jobs. Had workmen been properly instructed, they would not have turned or backed equipment unless an ample and proper signal had first been given. Oiling and greasing equipment while in motion ranks high in causing accidents.

Other causes include lack of safeguards such as a convenient step to reach the cab of a tractor or other equipment; falling against hot radiators, unprotected gears, or machinery; fires at asphalt plants; loose clothing; overturning trucks; overloaded equipment; cranes in contact with transmission lines; and poor housekeeping on the job.

Strides in Accident Prevention

We must not lose sight of the fact that improvements are being made in accident prevention. Well trained truck drivers, keenly on the alert against injury by the dipper of a shovel-bucket; watchmen, in addition to sign boards and barricades, at danger points on road jobs; properly trained flagmen; barricades on highway construction to prevent traffic accidents; color combinations to provide the greatest visibility to approaching motorists; "bombshell" torches encased in concrete (to prevent having them stolen) to augment barricades at night, are common sights on highway and airport jobs, and have made their contribution to accident prevention.

Blasting

Accidents incident to blasting, and storage of powder on highway and airport construction, thanks to the fine co-operation of contractors and officials alike, have not reached alarming frequency. The Institute of Makers of Explosives also deserves credit for the great reduction in blasting accidents.

Cooperative Accident Prevention

Aside from the splendid efforts on the part of highway and airport contractors to reduce accidents, officials who supervise these matters have done and continue to do a good job. The Federal

Public Roads Administration, the American Association of State Highway Officials, the Safety and Accident Prevention Branch of the U. S. Corps of Engineers, the Civil Aeronautics Administration, and others have contributed much to bring about greater safety in highway and airport construction. The American Road Builders' Association has long been gathering and disseminating information about accident-prevention measures, Mr. Macatee pointed out, and is proud of its part in the improvements that have taken place.

Tremendous savings have been effected on highway and airport construction by the thoroughgoing manner in which the Safety and Accident Prevention Branch of the Army Corps of Engineers tackled the problem. In a two-year period (1941-42) the reduction in accident frequency and loss of time resulting from accidents on war-construction jobs paid these dividends: 6,306,374 man-days saved; \$43,604,104 wages paid workers; 33,082 fewer lost-

time injuries.

Arbitrary Rules Undesirable

Hard and fast rules cannot be laid down to do away altogether with accidents. Nor is it desirable to set up arbitrary rules for that purpose. However, firmness is essential on the part of supervisors of highway and airport construction work. It is the responsibility of management, superintendents, and foremen to teach workers to think and act in order to avoid unnecessary chances. Workers must be made conscious of their responsibility to themselves and their fellow workers in preventing accidents. More than 60 per cent of accidents that occur in highway and airport construction can and must be prevented.

In the first three months of 1946, traffic fatalities totaled 8,120, the National Safety Council reports. At this rate, an increase of 44 per cent over 1945, more than 38,000 persons will be killed by the end of the year.

Light, Power Units For Construction Use

Light and power for construction and maintenance jobs and many other uses are available in a new line of equipment announced by the Consolidated Diesel Electric Corp. The firm produces portable and stationary diesel or gasoline-engine-driven generator sets in sizes of 5 to 75 kw, ac or dc.

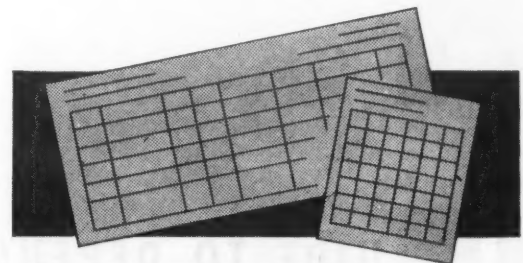
In addition to its generator line, Consolidated features a self-powered floodlight unit for construction needs. Trailer-mounted on pneumatic tires, this light plant eliminates the need for stringing cables from distant power supply. Floodlights are carried on the chassis and are removable for use where needed. The unit has outlets for taking off electric current with which to operate small auxiliary tools, pumps, etc.

An illustrated leaflet describing the entire Consolidated line is available on request. Write the firm at 230 E. 8th St., Mount Vernon, N. Y.

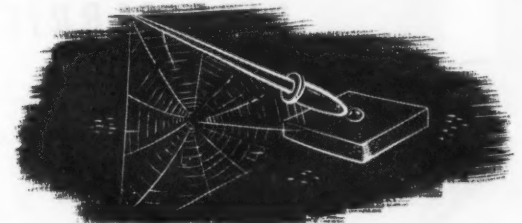
Peacetime or wartime Streamlined P. M. pays out

Preventive Maintenance played a large part in keeping overworked buses, trucks and contractors' equipment in the fight on the home-front during the war years. Now it can play an even greater part in your battle against high fleet operating costs.

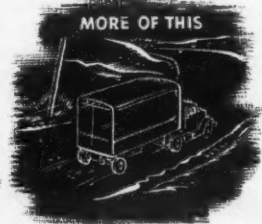
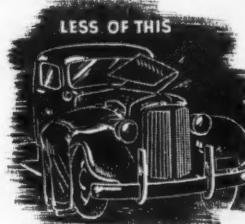
That is why Standard Oil continues to offer its Streamlined P.M. Plan to fleet operators in the Midwest. It is Streamlined because it is one of the simplest, workable P.M. plans available. Here are some of the advantages:



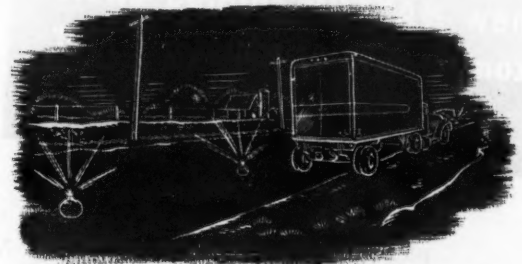
• Two forms are all that are needed.



• Record keeping is reduced to the minimum.



• Requires minimum shop time to maintain equipment in top condition.

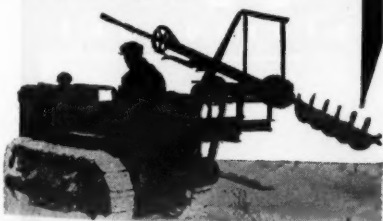


• Reduces road failures and lengthens life of new and old equipment.

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Mild-Steel Electrode

The Air Reduction Sales Co. has announced the production of a new all-position mild-steel electrode, Airco 312, designed primarily to prevent under-bead cracking in welding hardenable steels. Airco 312 is said to be more suitable than conventional mild-type-steel electrodes in low-alloy or mild-steel applications where stress relieving is desirable but difficult to obtain.

Readers may obtain further details on Airco 312 by writing to the Air Reduction Sales Co., 60 E. 42nd St., New York 17, N. Y.

New V-Type Engine Diesel-Power Source

Radically different from other engines in the firm's line, a new V-type diesel has been developed by the Cooper-Bessemer Corp., Mount Vernon, Ohio. It is designed to pack more horsepower into less space and with less weight. Built in 12 and 16-cylinder models, its applications include such construction equipment as draglines, dredges, excavators, and various stationary power units.

Known as the FV, the engine includes among its design details a four-valve head, a one-piece cylinder and head assembly, and a geared accessory drive enclosed in the main frame. Many design elements are incorporated in the V-type construction to make the unit more compact without detracting from its power. Fuel injection is accomplished by means of the jerk-pump system, in which each cylinder has its own measuring and injector pump, mounted close to the spray valve located in the center of the cylinder head. This

makes for additional engine streamlining. Wet or dry-sump pressure lubrication and double centrifugal pumps for cooling are other features.

Device Shakes Aggregate Out of Hopper-Bottom Cars

A new device to facilitate the unloading of hopper-bottom railroad cars filled with fine aggregate, wet sand, and like materials has been announced by Robins Conveyors Inc., Passaic, N. J.

The unit, called the Robins Car Shakeout, is said to allow as few as two men to unload a car in a matter of minutes, with little labor and no danger. Placed on the railroad car's sides, the Shakeout sets up a rhythmical seismic action which is transmitted throughout the car at a frequency of 1,000 cycles per minute.

An 8-page illustrated bulletin pictures this Shakeout in use and describes typical applications. Copies can be secured direct from the manufacturer.

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E. D. ETNYRE & CO., Oregon, Illinois

State Forces Rebuild 24 Miles of Highway

(Continued from page 1)

one mile. The gravel was dumped and spread in 8-inch layers by a Caterpillar Seventy-Five and an RD7 tractor-dozzer, half the road width at a time so that traffic could be maintained on the other half. Each layer was compacted by a Huber 10-ton 3-wheel roller.

For the first 20 miles of the project, the base course consists of a lower knapped course of native sandstone, 6 inches thick, and an upper 4-inch course of slag. The sandstone, which had a maximum size of 5 inches, was quarried by prison labor, but not enough was available to complete the entire job. The other 4 miles of base was laid with two 5-inch layers of slag which conformed to the following gradation:

Sieve Size	Per Cent Passing
3 1/2-inch	100
2 1/2-inch	35-70
1-inch	0-15
3/4-inch	0-5

This slag was purchased from the Standard Slag Co. at Weirton, W. Va., and shipped in barges over 200 miles down the Ohio and up the Kanawha River to a point about mid way of the project. The usual shipment was four barges, each holding 800 tons, towed by a 350-hp diesel tug. The job of unloading the barges and stockpiling the material on a flat bluff alongside the river was done by the Atlas Towing Co. of Parkersburg, W. Va.

A derrick boat with a 70-foot boom and a Blaw-Knox 1 1/4-yard clamshell

bucket transferred the contents of the barges into a 15-yard hopper at the edge of the river. From the bottom of the hopper the material dropped on one end of a Barber-Greene 150-foot belt conveyor, 24 inches wide, which moved it up the steep river bank to the open field where it was stockpiled. Three other Barber-Greene belt conveyors, 45, 60, and 60 feet long, were so arranged about this field that the slag moved in a continuous passage over all four belts and was piled up in orderly fashion. Four Wisconsin air-cooled engines operated the four conveyor belts, one engine to a belt.

With this equipment, 800 tons, or a barge load, of base-size slag was unloaded in a 10-hour day. When unloading slag screenings, from 3/4-inch down to dust, which were used in choking the base aggregate, as much as 1,200 tons of this finer material was unloaded in the same length of time.

Hauling and Spreading Slag

At the stockpile the slag was loaded by a Byers 1-yard shovel into seven trucks, Fords, Chevrolets, and Internationals, each holding about 3 yards. In order to retain the slag within the 20-foot width of pavement, wooden 2 x 8-inch forms, from 8 to 14 feet long, were used, and were supported by steel form pins driven along the outside every 4 or 5 feet. The slag was laid by a Buckeye spreader to a width of 10 feet, or half the pavement, in a 5-inch layer and then rolled by the Huber 10-ton 3-wheel roller. This lower course was then choked with the slag screenings, also applied from the mechanical spreader on the rear end of the trucks, and worked into the voids by a fiber drag boom pulled behind the

roller.

Following down the other side of the road, about 100 feet to the rear, was another crew doing the same type of work with similar equipment, a Buckeye spreader and Huber roller. In this way the two lanes were kept practically abreast of each other, better compaction was attained, and traffic passed through the gap between the two working crews. The same procedure for spreading and choking with screenings was followed for the upper 5-inch layer. This fine material was brushed thoroughly off the top of the upper course so that a clean surface would remain for the application of the prime which followed next. From 500 to 700 linear feet of 10-inch base course was laid full width in a 10-hour day.

Bituminous Work

The base course was then primed with 0.6 gallon of RT-3 tar to the square yard, purchased from the Reilly Tar & Chemical Corp. at Belle, W. Va., and shipped in tank cars 60 miles to a siding

not far from Henderson where it was transferred to a 1,000-gallon distributor which made an average haul of 20 miles to the project. The tar was applied for half width at least 48 hours before any laying of the plant-mix.

The Tri-State Asphalt Co. of Martins Ferry, Ohio, supplied and delivered the bituminous concrete to the job. For this purpose the company set up a Hetherington & Berner asphalt plant with a 1-ton pugmill near Fraziers Bottom, about halfway along the job, and produced about 350 tons of material in a 10-hour day. Seven company-owned trucks, each holding from 5 to 8 tons, hauled the black-top to the road where it was spread by a Barber-Greene finisher at a temperature of 225 degrees F. The hot-mix was laid in two courses, the first or leveling course being spread 110 pounds to the square yard, while the top or finishing course was laid 90 pounds to the square yard. After being compacted first by a Buffalo-Springfield 10-ton tandem roller and then by a

(Continued on next page)

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Esco 1 1/2 yard All-Cast dipper on Thew-Lorain "77" on Woodland-Martins Bluff job. Contractor: Leonard & Slate, Portland, Oregon.

ESCO DIPPER BUCKETS ...dig faster...last longer!

ESCO dipper buckets don't need to be pampered. Whether they're working in hardpan, gravel, boulders or rock, they do a full day's work, take abuse in stride.

This was proved to contractors Leonard & Slate recently on their Woodland-Martins Bluff highway job in Washington state. On this job 2-1/3 miles of 4-lane highway required the excavation of 665,000 yards of rocky, root-infested earth. Says Contractor Fred H. Slate, "Our operators found that Esco buckets dig fast, stand the gaff, require little attention."

Esco dipper buckets give:

1. **Faster Digging**—more passes per hour. This is due to clean cutting front with integral tooth bases, and

to flaring outside teeth which give clean, full bite. Tapered box allows quick, complete load discharge.

2. **Lighter Weight**—Use of strong, shock-proof manganese steel and hollow arch construction reduces weight without sacrificing strength. Less bucket weight, more payload per pass.

3. **Longer Life**—Esco design assures distribution of strain uniformly throughout the bucket. Parts subjected to wear and shock are made of manganese steel, reinforced.

ESCO makes two types of dipper buckets—the Cast-Welded for general purpose work and the All-Cast bucket for extremely hard service. They are fully illustrated and described in Esco bulletins 156 and 114B respectively. Get your copies from your nearest Esco representative or write us direct.

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State Forces Rebuild 24 Miles of Highway

(Continued from preceding page)

lighter Galion 8-ton tandem roller, the total thickness of bituminous concrete measured about 2 inches.

Slag aggregate, both coarse and fine, was used in the hot-mix and was purchased from the Standard Slag Co. at Weirton, W. Va., while the 85 to 100-penetration asphalt came from the Ashland Oil & Refining Co. at Ashland, Ky. The asphalt was hauled 90 miles to the plant by motor transport. A typical sample from both courses showed the following proportions:

Sieve Size	Per Cent Passing Leveling Course	Per Cent Passing Finishing Course
1/2-inch	100	100
3/4-inch	95.5	95.3
No. 4	51.3	59.7
No. 8	28.0	42.7
No. 20	11.8	29.7
No. 30	4.4	12.1
No. 200	.....	2.3

Asphalt, 85 to 100-penetration 7.2 7.9

As the pavement was completed, material from the borrow pits was brought in to build up the shoulders which were shaped and leveled by an Austin-Western power grader. A total of 110 convicts, black and white mixed, from the prison camp at Pliny located on the road about 10 miles from the lower end, worked on this project, along with 11 free men in supervisory capacities.

The major items on this job included:

Earth work	16,000 cu. yds.
Base course, 10-inch	80,000 cu. yds.
Tar prime	160,000 gals.
Bituminous plant-mix	30,000 tons

Bridge Contract

In conjunction with the grading and paving of the roadway, three bridges were raised and widened by contract. The first of these bridges from the Charleston end is a concrete-girder type crossing Little Hurricane Creek with a span of 130 feet. Built in 1929 along with the other two structures, this bridge was increased in length to 170 feet by constructing two new abutments behind the original abutments, and extending the deck back over the 20-foot span on each side. This was necessary because of the elevation in grade that was given to the approaches at either end which would have required an excessive amount of fill if the two new spans had not been added.

The 4 or 5-foot excavation for the

new abutments was done by hand, wooden forms were built, and were filled with concrete purchased from Pfaff & Smith Builders Supply Co. of Charleston, W. Va. Five to six truck-mixers made the 29-mile haul in about an hour, but the mixing did not start until after the trucks arrived at the bridge site. The abutments are 6 feet 8 inches high.

The original two concrete abutments and two piers were not disturbed, but the elevation of the bridge roadway was raised 19 1/2 inches by building a new deck on top of the old one. This added height was considered sufficient as the average high-water mark came to a point 18 inches above the slab. The new grade corresponds to gage height 58 or elevation 572.0, which is flood stage at Point Pleasant, W. Va., a town on the Ohio River at its confluence with the Kanawha. Maximum high water in 1913 and 1937 was at elevation 576.9. Since Ohio flood waters are felt far up the Kanawha, they also affect this

bridge over Little Hurricane Creek which empties into the river only 150 feet away.

New Deck Added

On top of the original 12-inch slab supported by three concrete girders, a new 7 1/4-inch deck was constructed. As the roadway was widened a foot on each side, from 20 to 22 feet, the existing 30-inch-high concrete railing had to be removed. This was done by battering it with a steel ram 4 inches in diameter and 10 feet long, swung from an A-frame mounted on a GMC truck. After this quick demolition the rough edges of concrete remaining at the base of the rail were trimmed off smoothly by a Cleveland jackhammer powered by a Sullivan 110-cfm air compressor.

Wooden forms for the new deck were then built up on a system of 2 x 4 joists placed at 16-inch centers, which in turn supported 2 x 4 stringers, two over each of the three original girders. The new girders are 1 foot deep, with the two

outer girders being 9 inches wide, and the center girder 18 inches wide. The extra width of bridge slab was taken care of by cantilevering the added foot along each edge. The 7 1/4-inch deck was reinforced with a double mat of 3/4-inch rods tied together to form 6-inch squares. A Mall vibrator was used on the concrete pours which were so arranged that only half the bridge was under construction at a time, thereby permitting the other half to be used for maintaining traffic.

Other Bridges

At the other end of the road, reconstruction of a similar nature was done to a bridge spanning Five and Twenty Mile Creek with the same dimensions and design as the foregoing structure. In between these two bridges is a concrete arch crossing Big Hurricane Creek with a foot of fill over the center of the ring. At this location a required lift of 3 1/2 feet on the road grade was

(Concluded on next page, Col. 2)



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A SUBGRADE WATERSTOP!

Baseal is the latest contribution by Servicised to the Road Building Industry, a base-sealing strip as the name implies—new in purpose, performance, and design. A preformed, flexible, adhesive strip in a roll. Stops infiltration at the Danger Point at bottom of every Lateral Expansion Joint.

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These Mayo 16-foot-diameter non-telescopic forms were used on the Nantahala hydroelectric project in North Carolina. This traveler remained in place during concreting.

Steel Tunnel Forms, And Allied Equipment

Steel forms for tunnels, sewers, and conduits, and other tunneling equipment are made by Robert S. Mayo, Lancaster, Pa. These forms are of all-welded steel construction, with machined edges to insure squareness and interchangeability. They are supplied in rigid or collapsible, telescopic and non-telescopic styles.

Other Mayo-built items include tunnel shields complete with all hydraulic equipment, shield jacks, control valves, hydraulic pumps, air locks, jumbos, and a wide variety of special equipment assembled to specification.

Bulletin 12, describing and illustrating the Mayo line of tunnel equipment, can be secured on request. When writing the manufacturer, it is suggested you send full details on your tunnel or sewer plans or problems, and mention this publication.

Non-Skid Conveyor Belt

Said to be capable of carrying wet rock up 25-degree grades without difficulty or slippage, the Griptop conveyor belt, made by the B. F. Goodrich Co., is described in a new folder. More than 1,000 rubber fingers cover each square foot of the belt's surface, a feature designed to make the conveyor virtually non-skid.

The new 4-page descriptive folder can be obtained by writing the firm at Akron, Ohio, and mentioning this notice.

State Forces Rebuild 24 Miles of Highway

(Continued from preceding page)

achieved by converting the arch into a concrete deck-and-girder-type bridge. This was accomplished by building thirteen piers, 29 feet 5 inches long x 1 foot wide and 4 feet high, plus two abutments, to support girders and an 8 3/4-inch concrete slab. The middle pier, which is directly over the center of the arch, and the adjoining pier on each side, rest on top of the arch wing, while the remaining piers and the two abutments are supported on the fill. For a more stable foundation the piers resting on the ground have a spread footing running the length of the pier, 2 feet 5 inches wide and 1 1/2 feet deep.

The distance, on centers, from the abutments to the first piers is 9 1/2 feet, while the other twelve spans are 9 feet 10 inches on centers, making the total bridge length 137 feet. The roadway was also widened from 20 to 22 feet, and a 1-foot 9-inch walk added on each side by cantilevering it out over the ends of the piers, after which a concrete rail was added.

Quantities and Personnel

On the reconstruction of these three bridges the Kanawha Construction Co. used a force of 15 men under the direction of Superintendent O. P. Mangus, working from June to November on the completion of the \$40,000 contract which included the following major items:

Excavation	500 cu. yds.
Concrete	850 cu. yds.
Reinforcing steel	55 tons

This 24-mile section of road improvement, together with the raising of three bridges, was a construction project of the State Road Commission of West Virginia which is now headed by E. L. Worthington, Commissioner, with M. L. O'Neale as Chief Engineer. George W. McAlpin is State Construction Engineer and B. D. Johnson is Construction Engineer. H. A. Levering was Resident Engineer on the State Route 17 job, assisted by J. T. Sullivan on the road work, and J. H. M. Erwin on the bridges.

Roller Features Shown

Design elements and specifications for the Buffalo-Springfield Roller Co.'s 10 and 12-ton 3-wheel rollers are presented in a new 16-page catalog, available

from the firm. The unit assembly of engine, transmission, differential, clutches, and final-drive pinions; the top-air intake; four-speed transmission, and other features are pictured.

Copies of Catalog 100 can be obtained from the firm on mention of this notice. The address: Springfield, Ohio.

This year the need for a record sale of Buddy Poppies is more vital than ever, and the Veterans of Foreign Wars have set a new goal of 16,000,000. Buy a poppy, not only as a tribute to the dead, but to help the living.

To Plan City Arteries

The appointment of two principal planning engineers for the recently organized City Arterial Route Planning Bureau has been announced by the New York State Department of Public Works. They are: Fred W. Fisch, Director of Traffic and City Planning for Schenectady since 1938, and Edgar B. Shrope of Elmsmere, Associate Engineer, who was in charge of traffic, economic studies, and design of arterial route connections to the Pennsylvania Turnpike.

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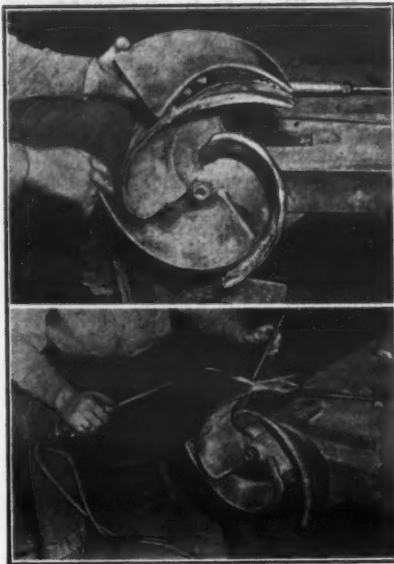
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Courtesy, Oxy-Acetylene Tips
A sheet-metal template (top photo), formed to the contour of a pump impeller blade, helped to avoid waste in building up the worn surfaces by means of welding.

Economy in Surfacing Worn Pump Impellers

A regular pump maintenance operation is the bronze-surfacing of the cast-iron impellers when they become badly worn. The surfaces are prepared for the bronze deposit by removing all grease, dirt, scale, or rust with a stiff wire brush, and flux applied liberally for chemical cleanliness. The welding rod is deposited with a slightly oxidizing flame. Careful tinning assures a good bond.

A unique method for obtaining the right contour and shape for the impeller

blades when welding deposits are being made is described in a recent issue of *Oxy-Acetylene Tips*. A sheet-metal template, formed to the desired final shape of the pump blade, was used by the welder as a guide to his progress. A flange was formed along the side of the template to correspond to the blade's trailing edge.

Similar in principle to the "go and no-go" gage, this sort of template has many applications. In helping the operator to avoid depositing too much weld metal on any one section, it saves materials, labor and time, and reduces the necessary grinding and machining.

North Atlantic Group Installs New Officers

Captain H. C. Whitehurst, Director of Highways of the District of Columbia, was installed as President of the Association of Highway Officials of the North Atlantic States at a recent Board of Directors' conference. W. B. McKendrick, of the Delaware State Highway Department, is the new Vice President of the group. A. Lee Grover, Secretary to the New Jersey State Highway Department, serves as Secretary-Treasurer.

New Truck Service Manual

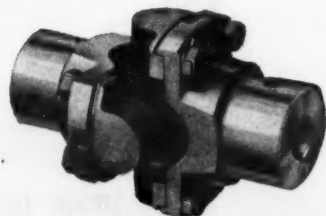
A line of approved service tools for use on International and other trucks is illustrated and described in a new service manual issued by the Owatonna Tool Co., 348 Cedar St., Owatonna, Minn. The manual presents methods which are said to effect savings in time, labor, and parts during removal and replacement of bearings, gears, pinions, pulleys, shafts, and other parts. Copies of Manual No. 3 can be secured from the firm, on mention of this notice.



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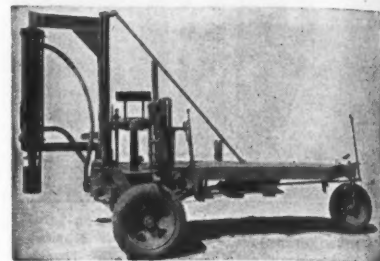
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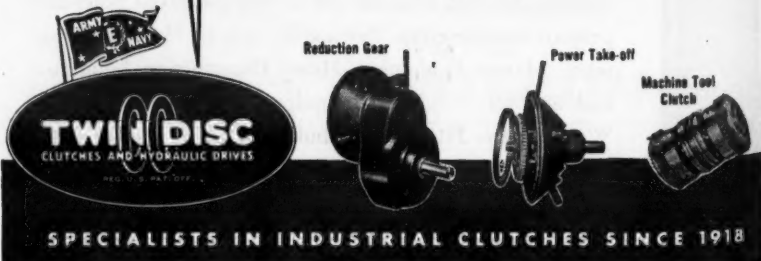
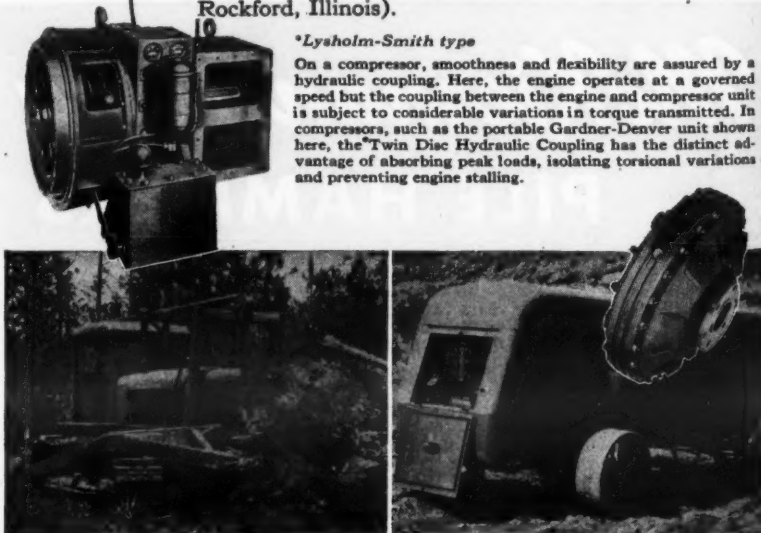
TWIN DISC Hydraulic Drives

assure smooth, flexible power

When dozing out stumps, the tractor hits an obstruction at high speeds and all working parts receive a solid shock. These shocks are cushioned with the installation of a Twin Disc Hydraulic Torque Converter,* such as in the Allis-Chalmers tractor pictured below. The hydraulic drive provides a fluid cushion which protects the entire tractor against destructive shocks. At the same time, the torque converter's "five-to-one" torque multiplication means steadily increasing push at reduced tractor speeds. The torque converter also provides the tractor with the equal of an *unlimited* set of gear ratios within a fixed speed range... automatically adjusted to give the most efficient power application at all times. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).

*Lysholm-Smith type

On a compressor, smoothness and flexibility are assured by a hydraulic coupling. Here, the engine operates at a governed speed but the coupling between the engine and compressor unit is subject to considerable variations in torque transmitted. In compressors, such as the portable Gardner-Denver unit shown here, the Twin Disc Hydraulic Coupling has the distinct advantage of absorbing peak loads, isolating torsional variations and preventing engine stalling.



SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918

Largest County

(Continued from page 2)

veyor by supervisorial action in July, 1938. The County Surveyor was also made County Flood Control Engineer by a state law which was adopted in May, 1939. General supervision of these three departments is now handled by Mr. Way directly through the office which formerly was that of County Surveyor. All contacts with the general public are made in that office.

There are eleven maintenance stations scattered through San Bernardino County, with a man in charge of each who is directly responsible for general maintenance and safety conditions within his district. Each station has a bulldozer, a grader, a truck, and various small tools for handling routine maintenance and emergencies. Lanterns and barricades are placed by these foremen, who maintain a constant patrol over their districts during storms or other emergencies. Should a eucalyptus tree fall in the streets adjacent to Redlands during a storm, it is the foreman's duty to remove it as quickly as possible and place warning lights to relieve the County of liability in case of accidents. In case of a flash flood far out on some remote desert road, washouts might remain unflagged and unrepaired for days with far less liability for the County than if the Redlands man had not found the eucalyptus tree within an hour.

These maintenance stations are bolstered by the main "striking force" of heavy equipment, which is stationed in the central yard at San Bernardino under the direct supervision of Ralph W. Motherspaw, Assistant Highway Commissioner. If new work or extensive maintenance is slated for a district which has neither the labor nor the machines to handle a job of that magnitude, Motherspaw sends whatever is needed to do the work. Machines assigned to a particular district in this manner use the local yard for servicing and stand-by during off hours. The essence of using a machine efficiently is to keep it working, and San Bernardino County has plenty of pieces of heavy equipment, such as power graders and bulldozers, which worked more than 200 days out of the last fiscal year.

In the winter months, during heavy snowstorms on mountain roads more than 6,000 feet high, the County sta-

tions its motor graders, bulldozers, and truck-mounted snow plows strategically on the basis of weather forecasts. Up to 36 inches of snow can be handled, even with lines of automobiles headed for the winter-sports area. More than 36 inches worries Motherspaw.

Funds for the road program come from the state gasoline tax, and are apportioned on the basis of vehicle registry. Out of the 3-cent gasoline tax, 1 cent goes towards the maintenance and upkeep of county roads and ½ cent for city streets. During the war years, when men and equipment were never plentiful, the County saved enough money so that now a cash reserve of \$288,932 is available for the coming fiscal year.

In some California communities a disagreement sometimes arises when cities or towns fail to obtain a fair proportion of the county funds. This is especially true where cash rather than performance is involved. Obviously a city spread over a great deal of territory has a harder job of road upkeep than a city of equal population cramped in smaller limits. The apportioning of funds is thus always open to argument.

Commissioner Way and the Board of Supervisors, acting under one of several legal channels of authority open to them, have solved this problem in human relations by making an individual study of each city, town, or village in the county with a view towards a fair division of funds. Then they pay off in real performance by assuming responsibility for the upkeep of certain agreed streets on a curb-to-curb basis. The smaller cities get the benefit of specialized county road machines and professional supervision at cost, on a non-profit deal. That is one reason why, when you drive through any settlement or city in San Bernardino County, you usually do so on streets that are smooth and well paved.

So long as Federal Aid for counties was on a dollar-for-dollar match basis, San Bernardino County declined to use very much of this help for the reason that it believes it can build more and better roads in its own way with available men and machines. Now California has enacted legislation matching Federal Aid from state funds for the benefit of counties. This makes about \$1,500,000 available to San Bernardino County over the next 3 years, and it will be used to augment projects planned for in the gasoline-tax and registration-fee part of the budget.

By centralizing available machines and authority and doing away with duplication of effort which has long dogged the steps of counties on the multiple-overseer system, San Bernardino County has come a long step towards 100 per cent utilization of its monetary resources for the good of the people who pay its taxes.

The Highway System

The county highway system is a far-flung network of roads which reaches from the Arizona state line on the Colorado River almost to Los Angeles, 280 miles away. In San Bernardino County it is possible to be 260 miles away from the county seat. Roads in this 20,157-square-mile area serve desert ranchers, prospectors, tourists, urban residents, and thousands of itinerant travelers with out-of-state license plates who are streaming through the inspection station at Needles to seek a new home under the California sun.

There are concrete roads, graded earth trails through some of the can-

yons and out-of-the-way places in the desert, gravel roads, and hundreds of miles of highways built with native materials and bitumen. In some remote canyons, road-mix is sometimes only 16 feet wide. In general, the County tries to keep hard-surfaced pavement at least 22 feet wide and in the southwestern part of the county, in the vicinity of metropolitan San Bernardino and the Los Angeles extended area, nothing less than 26 feet wide is placed. In the latest budget estimate, the road system was classified as follows:

Class of Construction	Miles	Maintenance Cost Per Mile
Concrete	30.3	\$118.81
Concrete with improved shoulders	8.7	137.93
Hot-mix on concrete base	3.7	166.22
Hot-mix on concrete base with improved shoulders	6.1	172.13
Bituminous macadam	136.3	138.30
Bituminous macadam with improved shoulders	7.6	104.60
Cut-back plant-mix	43.8	268.21
Oiled armor top	117.5	123.39
Road-mix (unsealed)	489.7	120.92
Road-mix (sealed)	321.4	167.98
Surface oiled dust	327.9	91.83
Gravel	220.2	78.66
Graded and drained earth	1,819.0	61.58

Total 3,532.2 miles

(Continued on next page)

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THE WELLMAN ENGINEERING COMPANY
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Largest County

(Continued from preceding page)

Maintenance forces vary from a first-class force of 30 or 40 men with a dozen machines to a lone motor-patrol operator. The latter travels farther than his urban and metropolitan counterparts, and his job is probably the most unique of all.

Lone motor-patrol operators, assigned long stretches of remote desert road in a far-off corner of San Bernardino County, frequently work a week in the same direction. They go out in their Caterpillar or Austin-Western or Adams motor graders, with a pick-up truck loaded with fuel, lubricating oil, small tools, and a few spare parts tied on behind the grader. They work all day grading, blading a ditch, or skimming the sand from cloudburst erosions off the road. When night settles over this expanse of purple sage, cactus, and blossoming verbena, the tired operator parks his grader off in the desert and gets in his pick-up truck to hunt some remote ranch house where he knows he will find food, perhaps a drink, and lodging for the night.

Sometimes Mr. Motherspaw sends a crew out in the shimmering heat of summer loaded with MC-3 road oil. They help these distant operators who occasionally remain out of touch with the office for as long as two weeks. Many of the macadam roads out towards Death Valley were mixed on the site by motor graders, using native material, and were rolled down by passing traffic. As a matter of fact, San Bernardino County pioneered many of the old roads out towards Death Valley. It broke a trail into the Lake Arrowhead resort area where heavy snows fall each winter, and it was the first county to adopt a white line in the center of the highway.

Roads are built as economically as possible, but with a view towards their use 25 years hence. Native materials for road construction can be found in great abundance. Decomposed granite, sand, and gravel are plentiful. Sub-grade conditions are generally excellent, except for some gumbo and clay near Chino. A commercial hot-mix asphalt plant near there has proved economical. The County seldom purchases gravel unless the price is under 75 cents per cubic yard, for it has developed a portable aggregate classifier of its own.

This rig is covered with wire-mesh cloth ranging from 3/4-inch to 2-inch, set on a 1 to 1 slope on an all-welded steel framework. The screen has a lifting chain at the top, and cleats at the bottom which hold it steady on a truck bed. When fine material is needed, the County picks up one of these handy portable screens and hauls it on the same trailer which carries the power shovel. Half-inch rock can be produced on a 1-inch screen by raising the truck-bed hoist a trifle to accelerate the slope of the screen. Truck beds have been standardized as to size irrespective of make. The loading shovel is used to move the screen from one truck to another.

Other specialized machines are a pile driver, with leads welded on the bulldozer frame of an Allis-Chalmers Model K tractor, and a 500-pound drop hammer controlled by the power take-off unit. A drag broom, made by threading steel wire through holes in a 2 x 6-inch timber and securing them with a second 2 x 6 placed on top, is used to drag secondary roads. The pile driver is used for driving steel railroad rails along eroding stream banks.

Employee Relations

Once each month the county employees meet in the San Bernardino yard to be entertained by movies, guest

speakers, or vaudeville acts, and every year there is a big Christmas party. These little bits of fun spice up an evening and make men receptive to changes of policy, new safety regulations, or commendations. They pay off well in employee relations.

San Bernardino County is also doing a piece of human rehabilitation work which has proved very successful. It is building roads with prison labor, but it is building men as well. In 1938, after a disastrous flood, the Board of Supervisors appropriated money to operate a penal camp, in which about 150 prisoners were kept, as a construction unit. On July 1, 1940, control of the camp, including the guarding of prisoners, was transferred to the Highway Commissioner and his staff. A large new camp recently installed west of Etiwanda provides individual bunks for the men, personal lockers, hot and cold water for showers at all times, modern sanitary facilities, reading matter, radios, and recreation. The food is wholesome and sufficient.

While in camp, the prisoners are furnished shoes, socks, underwear, trousers, and shirts. These supplies are checked in when they leave, repaired and cleaned, and then reissued to other persons. Prisoners are paid 25 cents for each day's work. They can draw on the commissary for candy, tobacco, razor blades, writing material, and similar articles up to that amount.

With several hundred men passing through the camp, there were only eight escapes in a year, each by a prisoner who was either mentally incompetent or incorrigible, to judge by his bad criminal record. On the whole there has been considerable progress made towards more and better work. The attitude of county prisoners has improved with each passing month, and their behavior and willingness to do hard work has been very noticeable. Nearly always Mr. Way has been able to select skilled workers and machine operators from among the prisoners.

During a 1-year period the average number of men at camp was 158. The

overall cost, including meals, clothes, transportation, guards, and foremen, has been \$1.20 per man per day. Since it costs \$0.58 merely to maintain the men in jail, a net cost of \$0.62 per man-day for work done is computed.

Maintenance of Equipment

San Bernardino County was fortunate during the war years in being able to purchase two new Allis-Chalmers HD-14 tractors, a new trailer and truck, and a new 6-wheel-drive International truck which now is being converted into a snow-plowing unit. Recently the County arranged for the purchase of two new Caterpillar D8 tractors from the U. S. Army, at a 30 per cent discount.

(Concluded on next page)

Punch-Lok

Hose Clamps and Fittings

LOOK, it's locked for safety



Today's Best Bet!

For Your Production and Maintenance Operations—
WRITE FOR CATALOG AND NAME
OF NEAREST SUPPLIER

PUNCH-LOK COMPANY

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For All Contracting and Engineering Projects

• ONAN ELECTRIC GENERATING PLANTS supply reliable, economical electric service for engineering and contracting uses as well as for scores of other general applications.

Driven by Onan-built 4-cycle gasoline engines, these power units are of single-unit, compact design and sturdy construction. Suitable for mobile, stationary or emergency service.

Models range from 350 to 35,000 watts. A. C. types from 115 to 660 volts; 50, 60, 100 cycles, single or three-phase; 400, 500, and 800-cycle, single-phase; also special frequencies. D. C. types range from 6 to 4000 volts. Dual voltage types available. Write for engineering assistance or detailed literature.

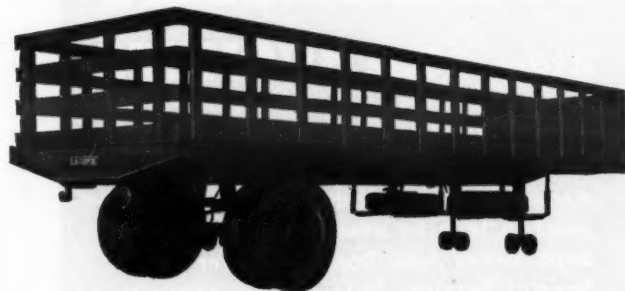
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"La Crosse" HIGH SPEED CARGO TRAILER

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22'
to
30'
Lengths



• STAKE BODY
• TIRE CARRIER
Optional Equipment

• 16 1/2 x 7 AIR BRAKES
• 18,000 LB. TUBULAR AXLE
• 12 TON CAPACITY

LA CROSSE TRAILER & EQUIPMENT CO.

418 Gould Street - Phone 4220 - La Crosse Wisconsin

Largest County

(Continued from preceding page)

But the secret behind continuous equipment performance is the centralized repair shop in the San Bernardino yard. There all kinds of heavy motor-repair jobs are done, including welding, blacksmithing, testing, lathe work, and overhauls. Drill bits are sharpened; the portable classifying screens were all made up there. The garage has a gas furnace for heating metal and a power hammer for sharpening blade edges. The shop and its personnel can and frequently do just about everything.

This repair shop is also the county garage, and all county-owned vehicles are repaired or serviced there. These include such units as the sheriff's automobile, the assessor's car, and so on. The following machines have been installed at the county shop to cope with this job:

Garage

- 1 Alemite-greasing hoist
- 1 small tools and motor-repair and testing facilities
- 1 Delta drill press
- 1 bench vise
- 1 Sioux valve-grinding machine
- 1 Shepard-Thomson Model 80 riveting machine
- 1 Otto drill press
- 1 threading machine
- 1 Wright 1½-ton chain hoists

Blacksmith Shop

- 1 drill press
- 1 Little Giant 100-pound power hammer
- 1 anvil
- 1 forge
- 1 bench vise
- 1 Manley 60-ton hydraulic press
- 1 Ingersoll-Rand gas furnace
- 1 Ingersoll-Rand IR-34 drill-bit sharpener
- 1 thread cutter, 1½-inch
- 1 Lincoln arc welding machine
- 1 Wilson arc welding machines
- 1 oxy-acetylene welding outfit

Big Job Ahead

San Bernardino County is growing rapidly. Its roads carry more traffic and bigger loads with each passing day. Its eight incorporated cities and its many sizable unincorporated communities, alive to the needs of their people, have done everything in the line of post-war planning from making preliminary estimates for sewage plants to the running of surveys for the purpose of finding out just who wants to buy a new refrigerator. Its planners are trying to make San Bernardino County a better place in which to live. If it is the first step that counts towards the realization of such a dream, San Bernardino County's Road Department has made it. It is a big step, and leads forward.

Federal Airport Act Now Ready for Action

Prompt appropriation of the initial \$100,000,000 of Federal monies for national airport development can be expected, now that Congress has approved the Federal Aid Airport Act. The program is expected to get under way July 1, 1946. A new interpretation of the recent order to stop unapproved construction includes runways, like roads, among approved work.

The new appropriation provides for \$500,000,000 to be spent on airport building and development during the next seven years, with the states matching the Federal Government's ante. Not more than \$100,000,000 of the Federal aid can be spent in any single year, and only 5 per cent can go for research, planning, and administrative costs.

The greater portion of the Federal monies, 75 per cent, is to be allocated to the states directly; half of that per cent on the basis of population ratios, and the other half in relation to area. The remaining 25 per cent will be distributed throughout the nation by the Civilian Aeronautics Administration at its discretion.

After the deduction of 5 per cent has been made for planning and administration, the states will receive \$356,250,000. The CAA's discretionary fund will be \$118,750,000. In addition to the

\$500,000,000 allocated to the states, Alaska will receive \$10,000,000 over the 7-year period, and Hawaii and Puerto Rico will receive \$5,000,000 each.

The Government will meet 50 per cent of the cost of airports in Class III or smaller. Larger projects can receive as much, if the CAA deems it necessary. The CAA administers all Federal aid for airports and is given broad powers in defining "allowable costs." Hangar construction is not so defined.

The apportionment of Federal Aid for airports is listed in the following table. The 5 per cent for planning and administration has been deducted.

State	Total State Apportionments
Alabama	6,893,546
Arizona	7,392,232
Arkansas	5,780,169
California	18,744,576
Colorado	7,671,269
Connecticut	2,619,216
Delaware	483,590
Florida	6,031,179
Georgia	7,717,176
Idaho	5,638,213
Illinois	14,061,652
Indiana	6,799,533
Iowa	6,768,153
Kansas	7,297,865
Kentucky	6,249,852
Louisiana	6,073,872
Maine	3,109,525
Maryland	3,099,660
Massachusetts	6,355,949
Michigan	10,577,613
Minnesota	8,751,281
Mississippi	5,781,455
Missouri	9,252,235
Montana	9,432,479
Nebraska	6,341,180
Nevada	6,664,746
New Hampshire	1,216,654
New Jersey	6,118,274
New Mexico	7,893,672
New York	21,249,005
North Carolina	7,962,888
North Dakota	5,037,571
Ohio	11,821,546
Oklahoma	7,297,561
Oregon	7,197,335
Pennsylvania	10,132,735
Rhode Island	1,041,463
South Carolina	4,413,380
South Dakota	5,415,098
Tennessee	6,454,411
Texas	24,478,073
Utah	5,752,896
Vermont	1,054,757
Virginia	6,046,380
Washington	6,379,645
West Virginia	4,011,198
Wisconsin	7,575,602
Wyoming	6,111,640
Total	\$356,250,000

New Ceylon Road Design

A new type of highway to provide for all kinds of road traffic has been adopted by the Public Works Department of Ceylon, the *Foreign Commerce Weekly* reported recently. The design calls for a roadway more than 100 feet wide, with a grass reservation and trees in the center, dual carriageways for vehicular traffic, and a strip of about 10 feet for bicycles.

The Colombo-Galle highway is at present being widened in accordance with this design.

Heavy-Duty Dump Bodies

Bigger payloads, less need for maintenance, and more profits for the contractor result from using Heil heavy-duty dump bodies and hydraulic dump-truck hoists, according to a new colorful 8-page bulletin. The booklet describes

the design and operating principles of the twin-cylinder hydraulic telescopic hoists used in Heil dump trucks, and shows many applications of this unit with Heil bodies.

Copies can be secured on mention of this notice. Write Heil at 3000 W. Montana St., Milwaukee 1, Wis.

GATKE Moulded Frictions KEEP THEM WORKING

Most operators and engineers will tell you that for effective results on Brakes and Clutches GATKE Moulded Asbestos Brake Materials can't be beat.

They give smooth, positive, non-grabbing action for easy handling dependability, long wear life with fewer adjustments, and lowest maintenance expense under all conditions.

GATKE Brake Materials have been developed and service-proved for every requirement of Excavating, Road Building, and Construction Equipment.

Avoid substitutes. If your equipment manufacturers do not furnish Genuine GATKE Materials, just tell us what you need.

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PREADS FORWARD AND BACKWARD Fast Non-Stop Spreading

- Spreads all materials to 1", wet or dry
- Spreads thick or thin
- Attaches to truck as tailgate
- Does not limit use of truck to spreading
- Controlled from cab with clutch
- Starts spreading with truck in motion
- No helper required
- Stops spreading with truck in motion
- Spreads forward or backward
- Half or full width of street
- Reduces number trucks required
- Positive uniform spread
- Fits any dump truck

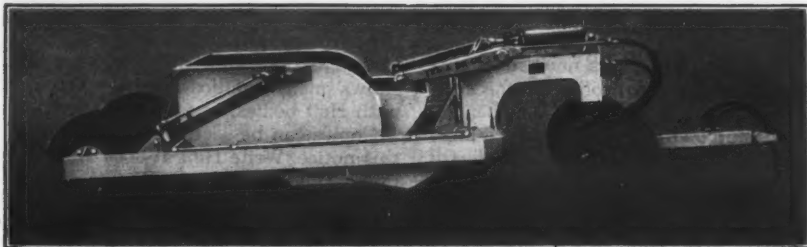
SELF-FEEDING
FLINK



USE FEWER MEN, TRUCKS, TIME

New simplified construction, installation and maintenance, new ease of operation . . . but basically the same practical, economical, efficient Flink spreader that has proved itself in a thousand tough road construction and maintenance jobs . . . in ice control and dust control all over America. Write for complete information.

THE FLINK COMPANY, Dept. 4 Streator, Ill.



One of the units in the Be-Ge line of dirt-moving equipment is the scraper available in capacities of 3 to 10 cubic yards.

Earth-Moving Units Do Modest-Scale Work

Included among the dirt-moving equipment manufactured by the Be-Ge Mfg. Co., are scrapers, land levelers, and dump wagons. These units are moderately sized and moderately priced, and hence are adapted to state and county maintenance work and to small excavating and earth-moving jobs.

Be-Ge scraper wagons are of the full-carry front-dump type, and are built in capacities ranging from 3 to 10 cubic yards. The line has seven models, each featuring low height and center of gravity, simple design, few moving parts, and overall economy of operation. All have the Be-Ge dual-valve hydraulic-power control.

Six models of land levelers are made by Be-Ge, two of them light-duty types for wheel tractors. Cut depth can be controlled from 0 to 5 inches, and dump from 0 to 16 inches, by adjustable cylinders. Wheels may be changed from side to rear position, depending on the use of the machine.

For use in close quarters there is the Be-Ge dump wagon. Built with or without a spreader, the unit has a capacity of 2 cubic yards. Mounted on

two wheels for front loading, it has a flat loading position, rear dumping, and controlled spread. Both cut and spread are controllable from 0 to 6 inches. Vertical adjustment of the wheels allows slope cutting.

Bulletins on these dirt-moving units can be secured by writing the Be-Ge Mfg. Co., Gilroy, Calif., and mentioning this notice.

Bronze Welding Rod Has a Flux Coating

A new flux-coated bronze welding rod has been announced by the Linde Air Products Co., a unit of the Union Carbide & Carbon Corp. Called the Oxweld 25M Flux-Coated, this new bronze rod is similar to the Oxweld 25M bare bronze rod, but is precoated with Brazo flux in proportions proper to its size.

The Brazo is held on the rod by a non-active binder which does not affect the weld, Linde explains. The flux is said to adhere firmly to the 25M, melting down into the molten puddle without burning off ahead of the rod. Weather conditions are said to have no effect on the coating, and the rod can be heated and bent without destroying its

coat.

Welders who have been annoyed at delays incidental to dipping the end of hot welding rods into the flux container may secure more information on this new item from the Linde Air Products Co., 30 E. 42nd St., New York 17, N. Y. Just mention this report.

Portable Torch-Burner Has Wide Range of Use

"Flame-throwers in the war of highway maintenance" might well be the description given the Aeroil No. 99 burner. The unit comprises a portable tank of kerosene and a torch capable of delivering a 2,000-degree flame. It is used to burn out weeds, stumps, etc., thaw out culverts, heat rocks for cracking, and many other duties. With a simple attachment it can be converted into a high-pressure sprayer. The torch serves also for light forge work, in pre-heating for welding, drying concrete forms, burning off paint, bending pipe, thawing aggregates, etc.

Leaflet 505 describing the No. 99 burner and showing some of its many uses can be obtained by writing the Aeroil Products Co., 5775 Park Ave., West New York, N. J. Mention CONTRACTORS AND ENGINEERS MONTHLY.

Wellpoints Solve Problem

How wellpoints were used to solve a difficult sewer-construction problem is reported in a bulletin "Wet Jobs" issued by the John W. Stang Corp., engineering firm and wellpoint-system manufacturer. The problem involved the installation in quicksand of a new form of concrete construction to protect 3,000 feet of vitrified-clay pipe.

Copies of the report, and literature concerning Stang wellpoint systems are available on request. Write the firm at 2 Broadway, New York 4, N. Y.

The careful and regular use of well selected lubricants of the right type for the job will keep your equipment operating longer and more profitably.



200 PARSONS WHEEL TRENCHLINER

DIRECT, SIMPLE POWER FLOW

Power goes to work fast on the Parsons 200 Trenchliner, flows in a direct line, without detours. You get maximum production per hour, because more power is delivered to the wheel.

ENCLOSED GEARS

All the gears that activate the operation of the Parsons 200 Trenchliner require lubrication only once a season because they are enclosed in oil-tight gear cases. Gears are cut from the solid; alloy steel shafts are mounted in anti-friction bearings.

PIVOTAL WHEEL MOUNTING

New pivotal wheel mounting, exclusive on the Parsons 200 Trenchliner, eliminates dirt catching slide tracks, simplifies fine grading in pipeline and drainage operations. Wheel drive chains stay tight in any wheel position.

2-POINT WHEEL BOTTOM SUPPORT

Wheel is supported at four points, but most firmly on the bottom where digging pressure is greatest. Two double-wheeled adjustable dollies are spaced close together to prevent frame distortion.

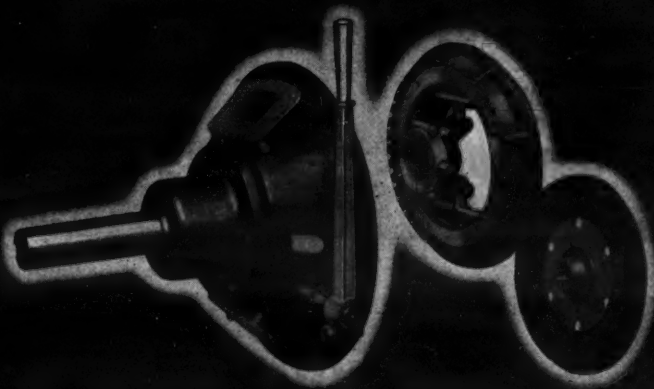
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TRENCHING EQUIPMENT



ROCKFORD



POWER TAKE-OFFS

SELF CONTAINED UNIT

WIDE RANGE OF SIZES

CONSERVATIVE RATING

ROLLER BEARINGS

FINE ADJUSTMENT

ACCURATE BALANCE

S.A.E. DIMENSIONS

* ROCKFORD POWER TAKE-OFFS are designed for generous overload capacity, when the standard length shaft is used and the center of the load is placed at a point half way along the shaft extension. The proportions of the shaft and bearings are determined by the load capacity of the clutch selected.

Send for This Handy Bulletin

Shows typical installations of ROCKFORD CLUTCHES and POWER TAKE-OFFS. Contains diagrams of unique applications. Furnishes capacity tables, dimensions and complete specifications.



ROCKFORD CLUTCH DIVISION

314 Catherine Street, Rockford, Illinois, U.S.A.

BORG-WARNER



Deliveries on this new battery-charging generator set are now being made by Kato Engineering Co.

New Battery Charger

Deliveries are being made on a new battery-charging engine-generator set, the Kato Engineering Co. of Mankato, Minn., has announced. Powered by a Briggs & Stratton NP engine, the unit will charge a maximum of about 80 amperes on 6 volts. Twelve and 32-volt sizes are also available.

The battery charger's engine has a 1-gallon fuel tank, float-feed carburetor, and gravity-feed sensitive flyball governor, which permits adjusting the charging rate. The commutator on the charger is of generous length, allowing the use of extra large dual brushes, four sets being attached to each stud.

Details and descriptive literature can be procured by writing the manufacturer and mentioning CONTRACTORS AND ENGINEERS MONTHLY.

New Dozers Described

Two new straight-type bulldozers, the No. 8S and No. 7S, for use with D7 and D8 tractors, are illustrated and described at some length in a broadside, Form 9198, just issued by the Caterpillar Tractor Co. These cable-controlled blades are featured by balanced design, ease of mounting and dismounting, rigidity, and long life.

Copies of this folder can be obtained by readers of CONTRACTORS AND ENGINEERS MONTHLY who write the Caterpillar Tractor Co., Peoria 8, Ill., and mention this notice.

Put Sawing on a Production Basis



WITH A
Mall Saw

To gain the economy and speed of mass production on construction jobs—use a Mall Saw. One cut assures a clean, square board end . . . reduces fitting time . . . takes fatigue out of sawing. Multiple cutting of like members speeds framing and form construction . . . saves lumber. A Mall Saw can be used for cross-cutting, ripping and bevel cutting to 45°. Also operates an abrasive wheel for cutting non-ferrous metals, cutting and scoring tile, stone and concrete. Equipped with sawdust blower and safety guard. Model 128 has 12" blade and 4½" capacity. Available for 110-volt AC-DC or 220-volt AC-DC. Furnished in all-steel carrying case.

Ask Your Distributor or Write Direct for Literature and Prices.

MALL TOOL COMPANY, 7743 South Chicago Ave., Chicago 19, Ill.

★ 25 Years of "Better Tools For Better Work"

WISCONSIN HEAVY-DUTY

Air-Cooled
ENGINES
on the job

WASHING GRAVEL...



Photograph courtesy of Diamond T Motor Car Co., Chicago, Ill.

The above typical service application shows a Wisconsin single cylinder air-cooled engine on the job, in a gravel dredging and washing operation in Mendocino County, Cal.

Wisconsin single and 4-cylinder air-cooled engines, from 1 to 31 hp., are giving good accounts of themselves in a great variety of applications, on many types of contracting and industrial equipment where heavy-duty serviceability and freedom from cooling troubles and attention are important operating factors. Specify Wisconsin Power for your equipment.

WISCONSIN MOTOR Corporation

MILWAUKEE 14, WISCONSIN

World's Largest Builders of Heavy Duty Air-Cooled Engines

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Contractors *and* Engineers Monthly

21 LOADS per 50 minute hour on 600' round trip

Tournapulls strip sod from building area
300 x 500', heap loads in 0.6 minute.



THAT'S THE PRODUCTION EACH TOURNAPULL DELIVERED FOR O'CONNOR ON FT. WAYNE SHORT-HAUL GRADING JOB

When J. C. O'Connor & Sons, Inc. was awarded contract for grading a factory site at Ft. Wayne, Indiana, their Tournapull fleet was busy shoulder-finishing near Bloomington, Illinois. Four Tournapulls drove the 230 miles to new job in 20 hours.

Here—in contrast with 2-mile cycle worked on road job—hauls were all short, about 600' round trip. Stripping dry sod, each Tournapull was push-loaded to capacity in 0.6 min., and, utilizing quick getaway, delivered 21 loads to dump area every 50-minute

hour . . . kept up this high-speed load, haul, spread and return production 9 hours per day. After completion at Ft. Wayne, rigs drove back to resume shoulder-finishing job in Illinois. High-speed production, plus mobility and job versatility, enabled these alert contractors to work this extra job into their Tournapull schedule.

Tournapull ability to deliver both long and short haul dirt at lowest-net-cost-per-yard is an established fact. Let us prove it to you. Call us TODAY!

RABC

Each rig averaged 600' round
trip cycle every 2.43 minutes.



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PEORIA, ILLINOIS • STOCKTON, CALIFORNIA



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Trade Mark Reg. U. S. Pat. Off.